HIGHLAND SCENIC HIGHWAY STUDY

FINAL
ENVIRONMENTAL IMPACT STATEMENT

Extension of West Virginia Route 150
From U.S. Route 219 to U.S. Route 250

MONONGAHELA NATIONAL FOREST

Pocahontas & Randolph Counties
West Virginia

May, 1982

FOREST SERVICE
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DEPARTMENT OF AGRICULTURE

24500 FINAL ENVIRONMENTAL IMPACT STATEMENT ; ‡b

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EXTENSION OF THE HIGHLAND SCENIC HIGHWAY
WEST VIRGINIA ROUTE 150 FROM U.S. ROUTE 219 TO U.S. ROUTE 250

MONONGAHELA NATIONAL FOREST
Pocahontas and Randolph Counties, West Virginia /‡c

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Date EIS was made available to the public: Draft ____________

Final ____________

Abstract: Five alternatives, to extend the Highland Scenic Highway from its present terminus at U.S. Route 219 to U.S. Route 250, are described and evaluated. The four different alternative alignments considered for the highway's construction are identified as: 1) Cheat Mountain - Shavers Fork; 2) Cheat Mountain; 3) Back Allegheny Mountain; and 4) Shavers Fork. The fifth alternative is the No-build Alternative; this being the Forest Service preferred alternative. Rationale for this preference is described within.

FINAL ENVIRONMENTAL IMPACT STATEMENT

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WEST VIRGINIA ROUTE 150, FROM U.S. ROUTE 219 TO U.S. ROUTE 250

MONONGAHELA NATIONAL FOREST
Pocahontas and Randolph Counties, West Virginia

GENERAL INFORMATION

A. Copies of this Final Environmental Impact Statement may be obtained from:

Mr. Harry B. Mahoney
Highland Scenic Highway Coordinator
U.S. Forest Service
P.O. Box 1548
Elkins, West Virginia 26241

B. The following Technical Reports form the basis for the preparation of this Environmental Impact Statement:

1. Public Participation Program - Working Paper No. 1
2. Description of Alternatives - Working Paper No. 4
3. Phase I Archeological Reconnaissance Report
4. Soils and Geology Assessment
5. Terrestrial Wildlife Evaluation
6. Water Resources Assessment
7. Air Quality Impact Assessment

These Technical Reports are available for review at:

The U.S. Forest Service
Monongahela National Forest
Sycamore Street
Elkins, West Virginia

C. Comments on this Final Environmental Impact Statement or any of the associated Technical Reports should be submitted to:

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SUMMARY

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The proposed action addressed in this statement is the extension of the Highland Scenic Highway (West Virginia Route 150) from the present terminus of the completed section of this highway at U.S. Route 219, approximately seven miles north of Marlinton, Pocahontas County, to U.S. Route 250 near Barton Knob, Randolph County, West Virginia (Figures 1 and 2). The length of the proposed extension will vary from 34.78 miles to 39.84 miles depending upon which of the alternatives developed for the project is considered. The development and construction of the proposed extension of the Highland Scenic Highway was authorized by Section 161 of Public Law 93-87, the Federal-aid Highways Act of 1973 (Appendix A), and funding for the necessary studies was provided by the 1978 Department of Transportation Appropriation Act. The environmental studies and analyses for the proposed extension are required by the National Environmental Policy Act of 1969. The Forest Service identified the need to prepare an environmental impact statement to document the analysis of the Highland Scenic Highway, east of U.S. Route 219, in 1973.

The study was focused on a reevaluation of four previously developed alignment alternatives established from studies by the Federal Highway Administration for the proposed extension of the Highland Scenic Highway. In addition to refinements of the alignments, grades and quantity and cost estimates for these proposed alignment alternatives, other possible alignments for the proposed highway extension, consistent with the parameters established by the authorizing legislation, were investigated and evaluated. The main effort in these studies, however, was directed to the development of land acquisition, recreational facilities development and visual management programs for the proposed highway and associated lands. These study requirements were mandated by the authorizing legislation and were necessary for conformance to U.S. Forest Service plans and programs for the affected subunits of the Monongahela National Forest.

The four alternatives considered for the construction of the proposed Highland Scenic Highway extension (Figure 3) are identified as follows:

Alternative	Designation	Segments	Length (Miles)
1	Cheat Mountain-Shavers Fork	A,B,G,C	38.91
2	Cheat Mountain	A,D,C	35.20
3	Back Allegheny Mountain	A,B,E,H	39.84
4	Shavers Fork	A,B,E,F	34.78

Each of these proposed alternatives includes the alignments of the scenic highway within a right-of-way, generally 1,000 feet in width; the associated land acquisition programs necessary to control the visual quality of the area observed from the highway; and recreational development planning at a level which would enhance the road-user's enjoyment of the highway. Most of the land in which each of the proposed alternatives are located is currently in private ownership. Within the scenic corridor, it is proposed to acquire needed privately-owned land outside of the right-of-way by easements. There are also acquisition areas proposed for each alternative which were

surface-mined prior to the enactment of the Surface Mining Control and Reclamation Act and have not been adequately restored to a condition providing satisfactory visual quality as seen from the highway. The acquisition programs propose the acquisition in fee of these lands to ensure adequate reclamation. A summary of the land utilization and needs (in acres) for each alternative follows:

		Fee Simple Acquisitions			
Alternative	Federally-Owned Land	R-O-W	Reclamation	Easements	Total
1	3,740	4,434	463	31,881	40,518
2	3,347	4,130	672	32,445	40,594
3	2,718	4,796	713	44,745	52,972
4	2,718	3,996	808	36,213	43,735

Costs estimated for the acquisition programs range from $15,527,000 (Alternative 1) to $21,136,000 (Alternative 3).

The recreational development planning for each alternative proposes facilities which will directly enhance the road-user's enjoyment of the highway. These facilities include scenic overlooks, picnic areas and interpretive trails. Consideration has also been given to providing a bikeway adjacent to the roadway. Costs for the proposed recreational facilities range from $1,082, 400 (Alternative 4) to $1,377,800 (Alternative 3), not including costs for the bikeway.

Estimated costs (in $1,000) for the implementation of each of the proposed alternatives have been projected as follows:

	Alternative			
	1	2	3	4
Land Acquisition	$15,527	$15,711	$21,136	$17,284
Construction and Engineering	42,091	39,021	37,225	35,275
Reclamation	542	542	773	1,132
Recreation Development	1,120	1,083	1,378	1,082
Erosion Control	773	653	790	1,063
TOTAL	$60,053	$57,010	$61,302	$55,836

Through public participation and inter-agency coordination and the scoping process, significant concerns for the proposed extension of the Highland Scenic Highway have been identified as: engineering and construction concerns, relative to construction in landslide prone areas and erodible soils, and in limestone bedrock areas and other areas where groundwater may be affected; project costs and relationship of benefits projected for the project compared

to project costs; effects on employment and revenue, particularly in regard to the timber harvesting and mining industries; effects of vehicular ignition interference on operations of the National Radio Astronomy Observatory; environmental impacts on water quality and water resources, including the recreational use of the area's streams, wildlife habitat, especially the black bear, snowshoe hare, and wild turkey, effects on rare or endangered species; concerns of energy use and consumption; climate-related impacts; and effects related to tourism and other travel/recreational uses. It has been determined beneficial effects for the proposed extension of the Highland Scenic Highway could be anticipated in the areas of tourism, recreational use, employment and revenue. There would be probable adverse effects relative to energy, project implementation costs, coal mining, timber management and climate-related effects. Construction impacts related to geology, soils, erosion and groundwater could also be adverse. It is also likely adverse effects on wildlife and water resources could occur. For many of these effects, mitigation measures could be applied which significantly reduces the adverse effects, but, often at substantially increased costs.

MAJOR CONCLUSIONS

As a result of the analyses and evaluations of the proposed alternatives for the construction of the extension of the Highland Scenic Highway, Alternative 2 has been recommended as the preferred build alternative. This selection is based upon Alternative 2 representing the best compromise in terms of anticipated costs, probable benefits and adverse effects of the four alternatives considered for construction. While the studies have indicated Alternative 2 is located into more areas of landslide potential and erodible soils and crosses more areas underlain with limestone, increasing possible risks of groundwater impacts, the nature of the topography and the slopes encountered permits a higher degree of adjustment of roadway lines and grades to overcome specific problem areas which may be determined more accurately during design studies. The other alternatives through the Thorny Flat area are more rigidly fixed relative to alignment and grade and lack the flexibility of Alternative 2 in this respect. Alternative 2 also does not have quite the same level of scenic quality that is associated with the alternatives through Thorny Flat, however, all of the alternatives are located in areas of extraordinary scenery and the level of scenic quality on Alternative 2 is not significantly diminished.

Despite the adequacy of Alternative 2 to fulfill the requirements for the extension of the Highland Scenic Highway, comparison with the No-action, or No-build, Alternative indicates serious reservations on whether the Highland Scenic Highway should be considered for extension within the parameters determined for the study, at least under foreseeable economic and environmental conditions. For these reasons, the No-build Alternative has been recommended as the preferred alternative for the disposition of the study. The selection of the No-build Alternative is based on consideration of the following:

- The estimated costs for construction, land acquisitions, recreational development, reclamation, mitigation of adverse effects, and economic losses in employment and the mining and timber management industries exceed the benefits which can be projected for the proposed project.

- Although most of the adverse impacts associated with construction of the project can be mitigated to an acceptable level to permit the construction of the highway, many impacts, particularly to wildlife habitat, are unavoidable.

- Although the land acquisition program proposed for the build alternative provides control over land use and development of the lands adjacent to the proposed highway, ensuring positive environmental protection within these lands, the studies have not established that current activities and development within these areas cannot be adequately controlled through existing regulations and practices.

- As a scenic highway designed for recreational use, the Highland Scenic Highway will provide little benefit to local or regional transportation needs.

- Visibility, particularly in the higher elevations where the highway is to be located, is frequently limited, reducing the ability to enjoy the scenic vistas available from the highway. Inclement winter weather may force the closing of the highway for extended periods.

- The construction of a highway for purely recreational use is not consistent with national goals for the reduction of energy consumption, particularly since it is indicated fuel consumption will be increased because of the construction, operation and maintenance of the proposed highway section.

Since the studies for the extension of the Highland Scenic Highway were performed specifically to fulfill the requirements of the authorizing legislation, Public Law 93-87, other options which may be available for the proposed extension were not fully developed in this study. These include:

- Utilization of existing U.S. Route 219 for the extension of the Highland Scenic Highway from the terminus of the existing section to a point north which is easily accessible to the regional highway network.

- Extension of the highway from the terminus of the existing section over the proposed alignment to intersect U.S. Route 219 in the Linwood area or northwest of Mace Knob. This alternative would extend the Highland Scenic Highway approximately 10 to 20 miles, shortening the travel distance on the parallel section of U.S. Route 219 by approximately five miles, providing a significant improvement to the local transportation system.

- Extension of the highway from the terminus of the existing section to connect to State of West Virginia secondary routes in the vicinity of the Town of Cass. This alternative would extend the Highland Scenic Highway approximately 17 miles and provide convenient service to major attractions within the area, but, would require the improvement of the secondary routes to adequately connect to the regional highway network.

AREAS OF CONTROVERSY

The Highland Scenic Highway has been a highly controversial project throughout its history. Originally proposed to extend approximately 160 miles from Richwood, West Virginia, to U.S. Route 50 between Gormania and Mount Storm, West Virginia, the Highland Scenic Highway was originally planned as a multiple use highway. The status of the highway was changed with the passage of Public Law 93-87, (Appendix A) which authorized the Secretary of Agriculture, through the Forest Service, to develop and construct the highway as a parkway, limited to passenger cars only, from West Virginia Route 39 to U.S. Route 250, near Barton Knob. This limitation has been a major source of controversy.

Other areas of controversy included the following:

- Changes in water quality and effects on the area's water resources including fish habitat, recreational use of streams, aesthetics of the natural streams and impacts on groundwater for water supply and fish hatchery production.

- Potential changes in wildlife habitat, population and diversity, particularly in regard to the black bear, wild turkey, snowshoe hare, threatened or endangered species and other wildlife of recreational or scientific interest.

- Potential changes in local or regional economics.

- Anticipated costs and benefits attributable to the project.

- Potential effects on energy use and consumption, including possible restrictions to use of local energy sources.

- Potential changes and restrictions in land and resource use and ownership patterns.

- Potential impacts on existing facilities including the National Radio Astronomy Observatory, Cass Scenic Railroad, historic Town of Cass, State forests and parks.

- Potential effects on visual and recreational resources in the area.

- Suitability of terrain, geology, and soils for highway purposes including considerations of safety and impact on existing transportation facilities.

- Consistency with U.S. Forest Service, other Federal, State, and local planning programs and priorities in the area.

- Climatic conditions affecting visibility and maintenance.

ISSUES TO BE RESOLVED

Due to the complexity of the controversies existing for the Highland Scenic Highway, it is doubtful that every issue and concern can be completely resolved to everyone's satisfaction. It is considered, however, the recommendation of the selection of the No-build Alternative is the most consistent alternative in response to the opinions and concerns expressed by the majority of the respondents during the course of the study.

Consistent with National Environmental Policy Act implementation procedures, responses and comments resulting from the circulation of this draft environmental impact statement will be analyzed and evaluated to determine the extent of any issues which may remain controversial. The opportunity for a public hearing on this study will also be presented during the period that the draft environmental impact is available for public and agency review. The comments resulting from the public hearing will also be considered in determining the extent of any remaining controversy. When the comments resulting from the circulation of the statement and public hearing, if one is held, have been collected, analyzed and evaluated, further consultation, if appropriate, with respondents will be undertaken to resolve any remaining issues. Any issues which are not finally resolved at this time will be indicated in the Final Environmental Impact Statement to be prepared after the review of comments and responses.

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SECTION I

I. INTRODUCTION

A. NATURE OF DECISION TO BE MADE

The Highland Scenic Highway was first proposed in the early 1960's as a 160 mile scenic road extending through the Monongahela National Forest from Richwood, West Virginia, northeasterly to U.S. 50 between Gormania and Mount Storm, West Virginia. Although intended primarily to provide opportunities for recreation and viewing of outstanding scenery, the road was originally planned as a multiple purpose road.

The first funds were provided by the Federal-Aid Highway Act of 1962, with construction beginning in 1965 at WV Rt. 39 near the Cranberry Mountain Visitor Center, 23 miles east of Richwood. Slightly over 22 miles of two-lane paved highway have been constructed between WV Rt. 39 and U.S. 219, seven miles north of Marlinton, West Virginia. The funding for the initial construction sections was provided by the allocations for Public Land Highways made available under several Federal-aid Highway Acts since 1962. As a Public Land Highway, the Highland Scenic Highway could not be limited to recreational use as had been done for parkways authorized by special Acts of Congress.

The status of the highway was changed by passage of the 1973 Highways Act (P.L. 93-87) in 1973. Section 161 of this Act (See Appendix A) authorized the Secretary of Agriculture, through the Forest Service, to develop and construct the highway as a parkway, limited to passenger cars only, from WV Rt. 39 to U.S. 250. The Act authorized acquisition and reclamation of lands and development of recreation facilities. The Act also provided that any proposed extension between U.S. 250 and Cunningham Knob shall follow existing routes.

The designation of the status of the Highland Scenic Highway as a parkway, limited to passenger cars, represented a significant departure from its original status. This change of status also represents a change in the funding source of subsequent sections of this highway. No funds were specifically allocated to the construction of the Highland Scenic Highway by Public Law 93-87, which indicated construction was not to be initiated until the Forest Service had acquired sufficient lands and interests in lands (including mineral rights) through the Shavers Fork Watershed to assure an adequate scenic corridor for the Highland Scenic Highway and the control of water quality in Shavers Fork. Funding for the current study originated from the 1978 DOT Appropriations Act which provided for a study on the Highland Scenic Highway. This study was limited to the extension of this highway from U.S. Route 219 to U.S. Route 250 near Barton Knob, and included specific reference to the requirements within the Upper Shavers Fork area contained in Public Law 93-87. It was also specifically indicated that the Highland Scenic Highway was to be designated as a Federal-aid secondary system route to allow highway trust funding to be used for this highway. The availability of funding, or more specifically, the Congressional allocation of funding, for the extension of the Highland Scenic Highway, as a consequence, remains a factor in the determination of the future course of the proposed project.

Construction of the Highland Scenic Highway has met with a considerable amount of controversy since original planning due to concern for potential impacts on water quality, wildlife habitat, land ownership, coal production, timber harvest, State and private recreation development, visual resource, and other resources.

This study is intended to determine the feasibility and desirability of extension of the highway to U.S. 250, to identify the most desirable location, and to propose acquisition, development, and management programs for the highway and associated lands.

There are two specific objectives of the study. These are:

1. Which of the alternatives proposed for the construction of the extension of the Highland Scenic Highway should be selected as the preferred alternative for construction?; and,

2. Whether, or not, the preferred build alternative selected as a result of this study should be built as the extension of the Highland Scenic Highway?

The study was based on a re-evaluation of four previous alternative alignments proposed for the extension of the Highland Scenic Highway developed by Region 15, Federal Highway Administration.[59] These proposed alignments were analyzed with respect to other possible alternatives that could fully, or partially, fulfill the requirements established by Section 161 of Public Law 93-87, and which were consistent with other Federal, State and local planning related to the project area.

The "No-build" or No Action Alternative, the consideration of not providing any of the alternatives proposed for the construction of the Highland Scenic Highway extension remained a viable alternative throughout these studies.

B. LOCATION

The proposed extension of the Highland Scenic Highway is located in Pocahontas and Randolph Counties in southeastern West Virginia, in the South Central portion of the Monongahela National Forest (Figure 1). The southern terminus of the proposed extension is on U.S. Route 219 at the intersection with the portion of the Highland Scenic Highway already constructed and opened to traffic (Figure 2). This terminus is approximately seven miles north of Marlinton, West Virginia. From this intersection, the alternatives proposed for the extension of the Highland Scenic Highway extend in a northeasterly direction until they intersect U.S. Route 250, the northern terminus of the extension (Figure 3).

The four alternatives considered herein are shown on Figure 3 and include:

<u>Alternative 1</u> - Cheat Mountain - Shavers Fork - enters the Shavers Fork headwaters but joins the Cheat Mountain Corridor west of the abandoned Town of Spruce - Segments A, B, G, C

<u>Alternative 2</u> - Cheat Mountain - generally follows the ridge line along Cheat Mountain - Segments A, D, C

<u>Alternative 3</u> - Back Allegheny Mountain - enters the Shavers Fork Watershed but is located along the ridge line of Back Allegheny Mountain on the eastern edge of the Shavers Fork watershed - Segments A, B, E, H

<u>Alternative 4</u> - Shavers Fork - parallels the Shavers Fork - Segments A, B, E, F

C. PROJECT PURPOSE AND NEED

The objectives for the extension of the Highland Scenic Highway from U.S. Route 219 to U.S. Route 250 near Barton Knob as a parkway as proposed by the Forest Service are:

1. To develop a logical extension of the existing Highland Scenic Highway as a significant recreation facility, providing an opportunity for the traveling public to view outstanding scenery over a driving distance of sufficient length to constitute a day's outing.

2. To provide a variety of quality outdoor experiences for rural and urban dwellers with emphasis on restful, uncrowded association with nature while driving over an attrative, low-speed route, free from distraction of heavy commercial traffic.

3. To protect and enhance the quality of air, water, soil and natural beauty, including nonreplaceable natural, historic, and archaeologic features.

4. Contribute to local and regional economics by expanding tourism opportunities.

5. To provide public access for recreational opportunities without excessive disturbance to the environment, with emphasis on dispersed recreation supported by developed recreation sites as needed.

6. To provide for user safety.

In addition to the above objectives for the project, preliminary analysis has resulted in the identification of opportunities offered by the proposed extension and development of the Highland Scenic Highway to U.S. Route 250:

1. Provide an opportunity for the driving public to view outstanding scenery.

2. Provide for acquisition of land and interests in land for protection of water quality in Shavers Fork River and management of wildlife habitat.

3. Provide for reclamation of existing surface mines.

4. Provide for a variety of dispersed and developed recreation opportunities along the Highway.

5. Improve access to existing recreation facilities.

6. Provide short and long term economic benefits to local and regional areas.

D. MAJOR ISSUES AND CONCERNS

Based on available information and coordination with local, state, and federal agencies and organizations and the public, the following have been determined to be significant issues and major concerns, and received a maximum level of evaluation and analysis.

1. Potential changes in water quality particularly in relation to fish habitat, and aesthetic and recreational use of streams and the suitability of ground water for domestic water supplies and fish production.

   a. Streams of concern

      - Shavers Fork and its tributaries (First Fork, Second Fork, Fish Hatchery Run, Beaver Creek, and Lambert Run) including potential effects on the Bowden National Fish Hatchery. Potential impacts will have to be evaluated for several portions of Shavers Fork within the study area.

      - Elk River Tributaries (Big Spring Fork, Cup Run, and Old Field Fork)

      - Headwaters of Tygart Valley River

      - Cloverlick Creek

      - Springs and ground water supplying individual water systems and the Edray Fish Hatchery

b. Types of potential impact

- Increased turbidity
- Sedimentation
- Change in heavy metal concentrations
- Change in water temperature

c. Acquisition needs to meet requirements of Section 161(h)(1)

2. Potential changes in wildlife habitat, populations, and diversity.

a. Species of particular concern

- Black bear
- Wild turkey
- Threatened or endangered species
- Other species of recreational and scientific interest

b. Types of potential impact

- Loss or degradation of habitat
- Changes in population levels
- Interference with breeding activities
- Increase of human/wildlife interactions

3. Potential changes in local and regional economy

a. Areas of concern

- Randolph, Pocahontas, and Nicholas Counties, WV
- West Virginia

b. Factors of concern

- Employment

- Income levels and distribution

- Changes in various components of the economy (tourism, mining, manufacturing, etc.)

- Economic diversity and stability

- Opportunities for commercial or manufacturing investment

- Local government revenues and required services

4. Anticipated costs and benefits

   a. Elements of cost

      - Construction costs
      - Land acquisition costs
      - Reclamation costs
      - Recreation development costs
      - Operation and maintenance costs

   b. Elements of benefits

      - Recreation use
      - Reclamation benefits
      - Commodity production
      - Environmental protection

5. Potential effects on energy use and supply related to construction, public use, and operation and maintenance of the highway, as well as possible restriction on utilization of local energy sources (coal, oil & gas, and wood).

6. Potential changes in land and resource use and ownership patterns

   a. Land use particularly related to

      - Timber and mineral production and plans

      - Development and operation of recreation facilities, particularly Cass Scenic Railroad and Snowshoe Resort

      - Residential and agricultural uses (particularly grazing)

      - Dispersed recreation opportunities (hunting, fishing, hiking, primitive camping, etc.)

      - State, regional, and local plans (development, recreation, transportation, land use, etc.)

      - Operation of the Green Bank National Radio Astronomy Observatory (particularly to electronic interference to automobile ignition systems)

      - Maintenance of "wild" or "wilderness" character

      - National Forest programs

   b. Land ownership changes

      - Federal
      - Private
        Commercial
        Non-commercial

7. The potential impact on archeological or historical sites and opportunities for protection of or increased public awareness of cultural heritage in accordance with existing legislation and executive orders.

8. The type, quantity, and quality of Visual and Recreation Opportunities to be provided in the project area.

   a. Recreation opportunities

      - Developed facilities
      - Dispersed sites, facilities, or areas
      - Range of opportunities to be provided

   b. Visual resource

      - Relation of viewing opportunities to highway location
      - Highway design and related appurtenances
      - Width of scenic corridor to be acquired
      - Interests to be acquired in a scenic corridor
      - Reclamation needed
      - Location of viewing points
      - Visual impact of highway itself
      - Coordination with management of other resources

9. Suitability of the location for construction of a two-lane paved scenic road in accordance with Sec. 161 of P.L. 93-87

   a. Engineering considerations

      - Suitability of soils and geologic members

      - Landslide potential

      - Topography as related to heights of cuts and fills and difficulty of handling of water

      - Public safety

      - Potential impacts on existing transportation facilities

   b. Other concerns not covered elsewhere

      - Consistency with or impacts on other plans and priorities

      - Climatic conditions related to visibility and maintenance

E. REQUIRED FEDERAL PERMITS AND LICENSES

1. U.S. Army Corps of Engineers, Section 404 Permits

It has been determined that U.S. Army Corps of Engineers Section 404 permits will be required for structures which may be required at the crossings of Big Spring Fork in the Elk River watershed and for those alternatives which cross the upper Shavers Fork. Under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), the Corps of Engineers has been delegated authority to regulate the discharge of dredged and fill materials into navigable waters. Since, during the construction of substructures for bridges over Big Spring Fork and Shavers Fork, materials will be excavated within the stream channels and backfilling will occur, authorization will be required and the application and processing of an individual permit for each structure will be required.

The applications for structures over Big Spring Fork are to be submitted to the District Engineer, Huntington District, U.S. Army Corps of Engineers, P. O. Box 2127, Huntington, WV, 25721, as this stream is in the Elk River watershed under the jurisdiction of the Huntington District. For structures over the Upper Shavers Fork, the applications for Section 404 permits are to be submitted to the District Engineer, Pittsburgh District, U.S. Army Corps of Engineers, Federal Building, 1000 Liberty Avenue, Pittsburgh, PA, 15222, as this stream is within the Monongahela River watershed under the jurisdiction of the Pittsburgh District.

2. Section 10 of the River and Harbor Act of 1899 Permits

It has been indicated that all streams in the study area are beyond the limits established for currently or historically navigable waters as defined for permits required under Section 10 of the River and Harbor Act of 1899.

3. U.S. Department of Interior, Fish and Wildlife Service

Title 16, U.S. Code 662(a), the Fish and Wildlife Coordination Act of 1958 (Public Law 85-624) requires consultation between the U.S. Fish and Wildlife Service and the appropriate lead agency when a federal action involves impoundment, channel deepening, or other modification of a stream or body of water. Preliminary studies have indicated that there is little probability of significant modifications of any of the streams to be crossed by the proposed alternatives. The U.S. Fish and Wildlife Service, which was contacted during the early coordination phase for the study, has indicated the Service will formally comment when the draft environmental impact statement is circulated.

Title 16, U.S. Code 1531, Section 7, the Endangered Species Act, requires consultation between the U.S. Fish and Wildlife Service and the lead agency when an action might jeopardize continued existence of endangered or threatened species or result in destruction or modification of critical habitat. Concerns for endangered or threatened species and destruction or modification of critical habitat in the study area has made coordination between the U.S. Fish and Wildlife Service necessary and this consultation has been continued throughout the course of the study. Formal U.S. Fish and Wildlife Service comments will be provided upon the circulation of the draft environmental impact statement.

4. U.S. Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES) Permits

National Pollutant Discharge Elimination System (NPDES) permits required under Public Law 92-500, Section 402, will normally be necessary if there are either of two highway-related activities involving wastewater. There are:

a. if there is disposal of effluents from sewage treatment facilities at rest areas, and

b. If there is discharge resulting from the production of asphalt emulsions and asphalt concrete.

Since sanitary facilities are to be provided at many of the picnic areas, further consultation with the West Virginia State Water Resources Board and the Chief, Division of Water Resources, as the State Water Pollution Control Agencies, will be necessary to determine if NPDES permits will be required for these facilities. This further consultation will appropriately be undertaken in the final design stage when design details for the proposed facilities have been established.

Storm water runoff from highways does not normally require a NPDES permit if the Federal Highway Administration's Federal Aid Highway Program Manual, Volume 6, Chapter 7, Section 3, Subsection 1, Erosion and Sediment Control on Highway Construction is followed.

5. Certification Pursuant to Section 401 of the Clean Water Act

State certification pursuant to Section 401 of the Clean Water Act (Title 33, U.S. Code 1344) assures that the proposed project will not cause applicable water quality standards to be exceeded. The request for certification is submitted to the West Virginia Department of Natural Resources, Environmental Analysis Branch, 1800 Washington Street, East, Charleston, WV, which coordinates total State comments and provides for issuance of the water quality certification. As required, consultation is to be undertaken with the West Virginia Department of Natural Resources, Public Land Corporation, 1800 Washington Street East, Charleston, WV, 25305, regarding issuance of required licenses.

The request for certification under Section 401 is coordinated with the application for the Corps of Engineer Section 404 permits. The Water Quality Certification from the State, required by Section 401, must accompany the Corps of Engineers Section 404 application (ENG Form 4345).

6. West Virginia Construction Water Quality Management Plan

The Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), further amended by Public Law 95-217, the Clean Water Act of 1977, provides, under Section 208, that the goals of the law be achieved

by establishing control programs to be administered by the U.S. Environmental Protection Agency through the individual states. The goals of the law are: 1) wherever possible, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water to be achieved by July 1, 1983; and 2) the elimination of all discharges of pollutants into the nation's waters by 1985.

The West Virginia Construction Water Quality Management Program has been prepared by the West Virginia Department of Natural Resources, Division of Water Resources, in cooperation with other State, Federal and local agencies, public and private groups and individuals. The West Virginia Department of Highways cooperated in the development of a plan to control and/or eliminate water pollution from the various types of construction activity as nonpoint sources of water pollution.

The West Virginia Construction Water Quality Management Plan is currently voluntary in that a regulatory program has not been formally promulgated to enforce requirements under the plan. Most construction activities with respect to control and elimination of water pollution are already regulated by existing regulations and standards and by inherent management practices. The Construction Water Quality Management Plan does contain a Model State Act for Soil Erosion and Sediment Control. Final construction plans for the extension of the Highland Scenic Highway will conform to the requirements suggested under this model act as well as the erosion and sediment control requirements and standards already established by the West Virginia Department of Highways prepared in coordination with the Department of Natural Resources. The coordination to ensure the construction of the Highland Scenic Highway complies with the DOH requirements will take place during plan reviews in the final design stage.

7. Local Permits

There have been no requirements for permits or licenses from local agencies identified for the proposed extension of the Highland Scenic Highway.

AFFECTED ENVIRONMENT

SECTION II

II. AFFECTED ENVIRONMENT

A. GENERAL DESCRIPTION OF THE PROJECT AREA

1. Land Ownership

Of the 1,673,590 acres of land within the boundary of the Monongahela National Forest, about half (848,092 acres as of September 30, 1980) is owned by the United States and administrated by the U.S. Forest Service (See Figure 4A). The Monongahela National Forest is divided into twenty-four planning units. The proposed extension of the Highland Scenic Highway is located primarily in two of these planning units, 12-Elk River Planning Unit, and 10-Upper Shavers Fork Planning Unit. The Elk River Planning Unit has a total of 120,400 acres with 36,500 acres in Federal ownership. The Upper Shavers Fork Planning Unit contains about 76,400 acres including approximately 33,800 acres of National Forest land.

In the area of the proposed Highland Scenic Highway extension, land is mainly held in private surface and subsurface ownership. The approximate location of property lines relative to the alternatives under study are shown on Figure 4B. The only significant National Forest land in the study area is at the southern end of the proposed scenic highway extension, or Alternative Segment A on Figure 4B. In this area, approximately 1.4 miles of the alternative is located on Federal land administrated by the Forest Service. Another 0.43 mile section of this alternative traverses National Forest land located between Moffett Knob and Gibson Knob. The remaining land along this portion of the proposed alignment is fairly large tracts in private ownership. As the alignment enters the Big Spring Fork watershed, several smaller property holdings along Secondary Route 9 are traversed.

North of Secondary Route 9, major property holdings of Fassifern Farms, Inc. and the Snowshoe Company are encountered. The Cheat Mountain Alternative, west of Mace Knob, traverses several smaller properties located east of U.S. Route 219, however, once the alternatives have been extended into the north half of the study area, the land ownership is almost all held by either the Snowshoe Company or the Mower Lumber Company. With the exception of the area south of the old town of Spruce, held by the Snowshoe Company, all of the land in the Upper Shavers Fork watershed is held by the Mower Lumber Company. The alternatives along Cheat Mountain occassionally extend to the western slope of Cheat Mountain into the Tygart Valley River watershed where they enter property under other ownership.

In terms of the number of tract ownerships from which acquisitions are required for each of the proposed alternatives, the following has been determined:

Alternative		Number of Tract Ownerships Traversed
1	Cheat Mountain - Shavers Fork	16
2	Cheat Mountain	21
3	Back Allegheny Mountain	13
4	Shavers Fork	13

Detailed discussions of the effects that land acquisition for right-of-way and visual and recreational development management will cause are presented in SECTION IV - ALTERNATIVES CONSIDERED, and SECTION V - EFFECTS OF IMPLEMENTATION, of this Statement.

2. Topography

The topography of the study area is dominated by the elevated Shavers Fork watershed that lies between Cheat Mountain on the west and Back Allegheny Mountain on the east (Figure 5). These two ridges begin at Thorny Flat, the nose of the syncline and the headwaters of Shavers Fork, and trend north-northeast. The ridges decrease gradually in elevation from 4,840 feet at Thorny Flat to 4,434 feet at Barton Knob and 4,000 feet at Gaudineer Knob in the vicinity of U.S. Route 250. The western side of Cheat Mountain slopes down to Tygart Valley, where the elevations are from 2,100 to 2,600 feet, at a regional slope of 8 to 11 percent. Local relief varies between 400 and 800 feet and mountain slopes are steep, ranging up to 60 percent but averaging 40 percent. The east side of Back Allegheny Mountain, the Allegheny Front, is a steep escarpment standing 2,100 feet above the Greenbrier River. The slope of the escarpment is a fairly uniform 30 to 40 percent with local slopes up to 60 percent. The most prominent gap in Back Allegheny Mountain is the one traversed by U.S. Route 250.

The area between Cheat Mountain and Back Allegheny Mountain is a heavily dissected plateau with a well integrated drainage network. The principal stream in this network is Shavers Fork, trending north-northeast. Rounded and knobby mountain tops, capped by resistant sandstones and conglomerates, stand at approximately the same elevation as the flanking ridges. Relief varies from 700 to 1,000 feet. Sideslopes, underlain by shale, vary between 25 and 60 percent, with some locations along the main streams being sheer canyon walls. Mountain tops, benches and bottom lands normally have slopes of less than 15 percent.

The Shavers Fork is in the early mature stage of development. The stream valley is narrow and V-shaped with only a small flood plain. From its source near Thorny Flat (4,440 feet) to U.S. Route 250 (3,550 feet), a distance of approximately 17 miles, Shavers Fork falls 890 feet. The average channel gradient is 53 feet per mile.

The manifestation of the Allegheny Front is illustrated by the fact that Shavers Fork, a north-flowing stream, falls from an elevation of 4,440 feet to 3,550 feet within the study area. The adjacent section of the Greenbrier River at the base of Back Allegheny Mountain, flowing south, falls from an elevation of 2,870 feet to 2,410 feet at Cass. The difference in the elevations of these two streams varies as much as 2,000 feet although they are only approximately four miles apart.

South and west of Thorny Flat, in the Unglaciated Plateau section, the topography is similar to that of the Shavers Fork watershed, but is more irregular and slightly lower in elevation. Topographic high points at Tallow Knob (4,052 feet), Gibson Knob (4,440 feet), Cloverlick Mountain (4,200 feet) and Gay Knob (4,360 feet). Maximum relief is 1,800 feet, but the average is

1,000 to 1,300 feet. Mountain slopes are generally 40 percent but range up to 60 percent. Principal streams are Slaty Fork, flowing northwest, and Cloverlick Creek, flowing southeast. The interbasin divide is Buzzard Ridge. The most prominent pass through the region is Pleasant Valley, traversed by U.S. Route 219. Cloverlick Mountain and Gay Knob form the southern border of the study area and constitutes the Allegheny Front through this area. South of the study area, the regional elevation drops to about 2,600 feet.

The consideration of the topography is of extreme importance in the planning of highway facilities in the study area. The mountainous terrain has a high potential of creating problems and imposing constraints on the location of feasible alignments. Extensive engineering studies have been undertaken to assure that each of the proposed alignments can be implemented satisfactorily within the topographic constraints. The topography has also been a significant factor in evaluating the proposed alignments for scenic qualities and opportunities to provide outstanding visual resources to users of the proposed extension of the Highland Scenic Highway.

3. Climate

The climate of the area in which the highway is to be located is predominately continental, with air masses originating in the mid-western United States moving eastward across the area. The prevailing westerly winds bring significant amounts of precipitation into the area. Precipitation is evenly distributed throughout the year.

The mean annual precipitation in the study area is estimated to be in excess of 60 inches with averages of over 65 inches in the Shavers Fork headwaters above Spruce. In the headwater area, precipitation occurs on an average of 250 days per year. Snowfall is common from October to April. It is estimated that the annual snowfall averages about 140 inches. Accumulations of snow, five to ten feet in depth, frequently occur throughout the area.

The general climate of the area is cool and humid. The mean annual temperature is 43°F with a maximum during the summer of about 90°F. In winter, the minimum is about -25°F, although it is reputed that the temperature at Spruce (elevation 3,850 feet) has dropped to -42°F. The average daytime high temperatures and nighttime low temperatures range between 70° and 54°F in July and 25° and 12°F in January. The frost-free growing season extends from mid-May to late September. The mean relative humidity is nearly 80 percent. Summers are highly humid while the least humidity occurs in the spring and early fall.

The acute differences in elevation throughout the area have significant impact on local weather conditions. Temperatures and precipitation vary widely throughout the area because of the topographic configuration. Low-lying clouds and fog, usually resulting from moist air moving upslope, are very common. Many of the higher elevations, above 4,000 feet, are cloud-covered frequently. Based on local observation, it is estimated visibility is severely limited by clouds or fog an average of three days a week during summer and winter, and less frequently during the spring and fall.

Acidic precipitation is a climatological phenomenon of particular concern in the study area. The incidence of acidic precipitation has become evident throughout much of the United States, Canada, northern Europe and Japan within very recent times. The pH of precipitation in many regions has declined, causing increased acidity of rain or snow. This phenomenon has been especially associated with the northeast portion of the U.S. and has been attributed to the long distance transport of sulfur and nitrogen oxides originating from power generation facilities and industrial plants in the midwest. The sulfur and nitrogen oxides are transformed in the atmosphere to sulfates and nitrates, which upon hydrolysis, form hydrogen ions ($H+$). When these hydrogen ions are present in sufficient quantities, precipitation becomes acidic. Normally, in the atmosphere when it is relatively free from natural or man-made emissions of oxides of sulfur and nitrogen, precipitation has a natural pH of 5.6 because carbon dioxide in the atmosphere dissolves in water vapor to form carbonic acid. With increased levels of atmospheric sulfur and nitrogen oxides, the chemistry of precipitation changes, becoming acidic because of the changing in the balance between major cations and anions in the precipitation.

The land form in the study area is a factor in the local significance of the acidic precipitation phenomenon. The Monongahela National Forest is generally aligned northeast-southwest along the Allegheny Mountains. The Allegheny Mountains in this area of West Virginia consists of several parallel ranges which increase in elevation from west to east until the Allegheny Front with elevations of 4,800 feet is encountered. Winds and storms generally approach these mountains from the west and southwest throughout most of the year. In winter, much of the flow is from the northwest bringing air from the industrial areas and power plants in northwest West Virginia, Ohio and Illinois into the study area. As the air flow crosses the mountains with increasing elevations, precipitation results as the moist air cools with the upslope movement. West of the Allegheny Front, the area receives 60 to 70 inches of precipitation annually. East of the Allegheny Front, the area receives 30 to 40 inches of precipitation annually.

Measurement within the Monongahela National Forest shows that precipitation generally is acidic. The range of pH values is from 2.8 to 8.3 with an overall average of 4.5. This high level of acidity in precipitation is attributed to the large amounts of acidic atmospheric pollution being washed out by the precipitation west of the Allegheny Front.

The unique vegetation and soils types found in the study area are sensitive to the additional burden imposed by acidity from precipitation and this phenomenon is a cause of increasing concern in the Monongahela National Forest.

4. Proximity to Special Interest Areas

The study area is located in a part of West Virginia which is rich in points of interest. These points of interest include areas and sites having scenic, botanical, cultural, zoological, archeological, historical or other values. The following points of interest are located within or immediately adjacent to the study area for the proposed extension of the Highland Scenic Highway (Figure 2):

a. Green Bank National Radio Astronomy Observatory
b. Cass Scenic Railroad
c. Snowshoe Ski Area
d. Gaudineer Scenic Area
e. Edray Trout Hatchery
f. Blister Run Swamp

There have been thirty special interest areas identified throughout the Monongahela National Forest. Those which have been formally classified include the following:[1]

	Name	Formal Classification
a.	Otter Creek Wilderness	Wilderness
	(1) Shavers Mountain Spruce Patch	Natural Landmark Within Wilderness
b.	Big Run Bog	Natural Landmark
c.	Dolly Sods Wilderness	Wilderness
d.	Dolly Sods Scenic Area	Classified Scenic Area
	(1) Fisher Spring Run Bog	Natural Landmark (Within Wilderness and Scenic Area)
e.	Spruce Knob - Seneca Rocks	National Recreation Area
f.	Blister Run Swamp	Natural Landmark
g.	Cranberry Glades	Botanical Area Within Wilderness Study Area
h.	Hills Creek Falls	Scenic Area
i.	Hellhole Cave	Critical Habitat
j.	Gaudineer Scenic Area	Scenic Area and Natural Landmark

The relationship of the proposed project to those areas nearest it is shown in Figure 8.

In addition to these formally classified special interest areas, many other points of interest including candidate special interest areas are located within the Monongahela National Forest. Generally, however, these other areas are outside of the immediate study area.

The National Radio Astronomy Observatory, because of its proximity to study area and the potential effect of the proposed alternatives on its operations, requires specific consideration. The National Science Foundation, through Associated Universities, Inc., purchased the 2,700 acre site which is now the observatory complex in 1957. The observatory consists of the facilities for the radio telescopes and the associated scientific equipment as well as administrative, maintenance and residential facilities for the support and research staff of approximately 140 people. The facilities are available for use by qualified scientists and many important astronomical discoveries have been made at the Green Bank National Radio Astronomy Observatory. Radio astronomy is expected to maintain its importance well into the future as man attempts to unravel the mysteries of the universe.

The site for the observatory at Green Bank was selected because the surrounding mountains tend to shield the radio astronomy equipment from stray electrical impulse interference. The remoteness of the area, small population

and lack of industrial development was considered to adequately diminish possibilities of outside interference to the operation of this equipment. The increasing sensitivity of modern receivers used in radio astronomy has increased the concern for protection from local interference. To preserve the area's low level of interference a National Radio Quiet Zone has been established under agreement with the Federal Communications Commission (FCC). Under this agreement, the National Radio Astonomy Observatory is permitted to review and comment on applications to the FCC and National Telecommunication and Information Administration (NTIA) for radio transmitter licenses that may affect their operations. The State of West Virginia has also enacted similar legislation giving further local protection to the observatory's work. The observatory, however, does not have the authority to control construction of the use of radio transmitters within the area which may adversely affect the operations at the observatory.

In addition to interference caused by radio transmitters in the proximity of the observatory, interference can also be caused by vehicular ignition systems. The National Radio Astronomy Observatory has no authority to control nearby land uses or the transportation system of the area, although these could be sources of adverse effects on their operations. The observatory does have the opportunity to review and comment on proposed land use changes and transportation system improvements which may affect their work.

5. Population and Economy

a. Introduction

The focus of the assessment is on the two counties (Randolph and Pocahontas) which, by virtue of their location, would be most immediately affected by any changes in land use within the project area. Data for other West Virginia counties are considered only where necessary for purposes of comparative analysis or where economic impacts stemming from the proposed actions are likely to be regional in nature. In such cases, the unit of analysis is extended to include the 12 counties that make up West Virginia Planning and Development Regions 4 and 7 (Figure 6). Together, these regions cover a land area of approximately 7,200 square miles, or about 30 percent of the total area in the state.

b. Population

Randolph and Pocahontas counties both experienced declines in population between 1950 and 1970 due to changes in the structure of the local economy that were reflected in a loss of jobs, substantial out-migration, and an aging population base. The trend since 1970, however, has been one of growth at rates exceeding the predictions of regional planning authorities. Although neither county has as yet regained its 1950 population strength, preliminary 1980 Census counts indicate that there are now some 38,700 people residing in the two-county area -- a net rise of 15.7 percent over the past ten years. Similar trends have been observed throughout the region and, to a lesser extent, throughout the state (Table 1).

TABLE 1

HISTORICAL AND CURRENT POPULATION TRENDS, 1950-1980

	Population (000's omitted)				Percentage Change	
	1950	1960	1970	1980	1950-70	1970-80
Pocahontas County	12.5	10.1	8.9	9.9	-28.8	+12.0
Randolph County	30.5	26.3	24.6	28.8	-19.4	+17.0
Two-County Total	43.0	36.4	33.5	38.7	-22.1	+15.7
Region 4	179.8	145.4	122.7	144.8	-31.8	+18.0
Region 7	129.0	110.8	103.5	118.7	-20.5	+14.7
Regional Total	308.8	256.2	226.2	263.5	-26.7	+16.5
West Virginia	2006.0	1860.4	1774.2	1928.5	-11.6	+ 8.7

Sources: 1950-1970: U.S. Census of the Population.
1980: U.S. Census, preliminary estimates.

TABLE 2

COMPARATIVE PERSONAL INCOME DATA, 1969-1978

	Per Capita Personal Income		Percentage Change
	1969	1978	1969-1978
Randolph County	$2,226	$5,792	+160.2
Pocahontas County	1,888	5,271	+179.2
West Virginia	2,772	6,629	+139.1
United States	3,733	7,836	+109.9

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, and West Virginia County Data Sheets.

TABLE 3

SELECTED EMPLOYMENT STATISTICS
POCAHONTAS AND RANDOLPH COUNTIES, 1979

Item	Randolph County Number	Randolph County Percent	Pocahontas County Number	Pocahontas County Percent
Average Annual Employment	10,640	95.8	3,420	93.5
Average Annual Unemployment	710	6.2	240	6.5
Average Civilian Labor Force	11,350	100.0	3,660	100.0
QUARTERLY UNEMPLOYMENT RATES				
January - March		8.1		8.1
April - June		5.6		6.8
July - September		5.6		5.7
October - December		5.7		5.4
EMPLOYMENT DISTRIBUTION BY SECTOR				
Mining		5.8		1.5
Construction		4.3		2.0
Manufacturing		12.1		16.1
Transportation/Public Utilities		5.2		2.9
Wholesale and Retail Trade		15.8		8.8
Finance/Insurance/Real Estate		2.3		1.5
Services		18.4		16.1
Government		16.4		29.5
Other		19.7		21.6
Total		100.0		100.0

Source: West Virginia Department of Employment Security.

TABLE 4

COMPARATIVE AVERAGE WEEKLY WAGE DATA BY INDUSTRY, 1978

Industry	Average Weekly Wages Paid By Industry In: Randolph County	Pocahontas County	West Virginia
Mining	$343	$---	$342
Construction	226	369	283
Manufacturing	158	177	290
Transportation and Public Utilities	271	267	288
Wholesale Trade	233	176	252
Retail Trade	138	166	135
Finance/Insurance/Real Estate	186	242	199
Services	150	182	166

Source: West Virginia Department of Employment Security. All figures are rounded to the nearest dollar.

In 1970, about 70 percent of the area's population was living in outlying settlements or in unincorporated communities built up over the years near major and secondary roads. Densities ranged from under six people per square mile along the sparsely-settled eastern mountain ridges to 167 people per square mile in the Leadsville District (Elkins and environs) of Randolph County. Average density for the area as a whole was 16.6 people per square mile.

c. Income

Personal and household incomes in the two-county area are still well below statewide and national figures (Table 2). The 1980 Survey of Buying Power ranks Randolph and Pocahontas Counties 30th and 34th respectively among West Virginia's 55 counties in terms of median household effective buying income (EBI). Over one-third of area households have annual EBI's of less than $8,000, whereas only 21 percent of households nationally fall within this category.

d. Labor Force Characteristics and Employment

In 1979, the civilian labor force in the two-county area averaged 15,000 people, or about 39 percent of the resident population. Government, services, and manufacturing industries account for the bulk of non-agricultural wage and salary employment. Few Randolph County residents commute to work in other counties. In Pocahontas County, there is a limited amount of commuting across county lines on the part of mining, manufacturing, and construction workers.

While 1979 unemployment rates for Randolph (6.2 percent) and Pocahontas (6.5 percent) exceeded the 5.6 percent statewide average, they compared favorably with rates experienced by counties in the surrounding regions, particularly in Region 4 where annual percentage figures ranged from 7.3 (Greenbrier County) to 12.7 (Webster County). Local and regional data for the first six months of 1980 show patterns of rising unemployment consistent with those found in West Virginia and the nation as a whole.

In both counties, unemployment levels exhibit strong seasonal fluctuations, peaking during the winter months due to layoffs in the non-manufacturing sectors (Table 3). Average weekly wages paid by most manufacturing industries in the area are relatively low, with the best paying jobs being found in mining, transportation (mainly trucking), and construction (Table 4).

e. Economic Activity

(1) Agriculture

There are more than 800 farms in the two-county area, including some 40 large holdings of 1,000 acres or more (Table 5). Most farm acreage is utilized for grazing livestock, and livestock and poultry products account for more than 90 percent of all farm product sales. In 1970, less than two percent of the area's workforce was engaged primarily in agriculture or related pursuits, compared with nearly 20 percent in 1940. This trend has been accompanied by a steady decline in the number of farms and an increase in average farm size.

TABLE 5

SELECTED FARM CHARACTERISTICS
POCAHONTAS AND RANDOLPH COUNTIES, 1978

Item	Randolph County	Pocahontas County	Total
Number of Farms	379	436	815
Percent Change: 1974-78	-3.3%	-1.0%	-2.0%
Total Farm Acreage	118,700	125,100	243,800
Percent Change: 1974-78	-11.8%	-8.6%	-10.4%
Harvested Cropland Acreage	14,600	14,200	28,800
Average Farm Size (acres)	313	287	299
Farm Size Distribution			
Under 10 Acres	9	11	20
10 - 179 Acres	200	203	403
180 - 999 Acres	149	203	352
1,000 Acres and Over	21	19	40
Farm Sales Distribution			
Less Than $2,500	162	158	320
$2,500 - $9,999	137	191	328
$10,000 - $39,000	62	77	139
$40,000 and Over	18	10	28
Market Value of Farm Products Sold			
By Farms with Sales of $2,500 and Over	$3.3 million	$2.9 million	$6.2 million
By All Farms	$3.7 million	$3.2 million	$6.9 million
Percent Value Distribution by Product (All Farms)			
Livestock and Livestock Products	91.7%	94.1%	92.8%
Crops	8.3%	5.9%	7.2%

Source: U.S. Census of Agriculture, 1978, Preliminary Report.

(2) Forestry and Forest Products

In spite of a 40 percent drop in forestry-related employment over the past 15 years, this sector still accounts for close to one-third of all manufacturing jobs and more than one-half of all manufacturing firms in the two-county area. The amount of direct employment generated by capital-intensive timber and logging companies is small relative to the contribution of sawmills and other industrial operations which depend on commercial forests for their raw materials, In 1978, there were 26 such operations in Randolph and Pocahontas Counties, with more than 600 employees and a $4.5 million annual payroll (Table 6).

(3) Mining

Mining is an important source of jobs and income in Randolph County, which ranks 19th among West Virginia's 35 coal-producing counties. Output in 1979 was about 1.1 million tons, nearly 70 percent of which was taken from underground mines. These data reflect a 12 percent decline compared with 1978 production figures as well as a sharp reversal in the underground:surface production ratio. The resurgence in labor-intensive underground mining operations also explains the rise in mining employment and the fall in working productivity levels experienced in 1979 (Table 7).

The 1979 payroll of the 22 companies engaged in bituminous coal and lignite mining operations was $12.5 million, approximately double the amount paid out in 1976. Local planning authorities predict a promising future for coal in Randolph County, and a corresponding growth in jobs and income generated by mining. The outlook for Pocahontas County is less certain, as most of the County's known coal reserves are relatively inaccessible and located in areas that are far from major markets.

(4) Manufacturing

Apart from forest products industries, the bulk of industrial employment in the two-county area is provided by firms engaged in the processing and manufacture of textile, rubber, leather, and primary metal products (Table 8). Both counties have experienced significant decreases in manufacturing employment over the past few decades. Local development authorities have created industrial parks in Elkins and Marlinton in an effort to reverse the trend.

(5) Other Economic Sectors

In recent years, any negative effects attributable to the decline in manufacturing jobs have been moderated by the strong growth performance in the trade and service sectors. Among the factors contributing to this growth have been the development of several new regional shopping centers on the outskirts of Elkins, some expansion in the tourism industry, and staff increases at local health and educational facilities. A burgeoning of activity in the construction, finance, and real estate sectors, while less significant in terms of jobs and income, is also indicative of the improving health of the area's economy.

TABLE 6

LUMBER AND WOOD PRODUCTS INDUSTRY (SIC 24): SELECTED DATA
POCAHONTAS AND RANDOLPH COUNTIES, 1978

Item	Randolph County	Pocahontas County	Total
NUMBER OF FIRMS			
Logging Camps and Contractors	12	1/	12
Sawmills and Planing Mills	12	5	17
Other	4	5	9
Total	28	10	38
EMPLOYMENT			
Logging Camps and Contractors	92	1/	92
Sawmills and Planing Mills	361	96	457
Other	167	40	207
Total	620	136	756
ANNUAL PAYROLL			
Logging Camps and Contractors	$ 627,000	1/	$ 627,000
Sawmills and Planing Mills	2,650,000	$ 591,000	3,241,000
Other	962,000	296,000	1,258,000
Total	$4,239,000	$ 887,000	$5,126,000

1/ Included under "Other."

Source: U.S. Department of Commerce, Bureau of the Census, County Business Patterns, 1978.

TABLE 7

TRENDS IN COAL PRODUCTION, EMPLOYMENT, AND WORKER PRODUCTIVITY
RANDOLPH COUNTY, 1960-1979

Year	Production (tons)	Average Annual Employment (number)	Worker Productivity (tons/workers)
1960	1,139,382	655	1,739.5
1965	999,307	496	2,014.7
1970	629,243	335	1,878.3
1975	888,439	428	2,075.8
1977	1,196,226	520	2,300.4
1978	1,291,464	536	2,409.4
1979	1,131,175	690	1,639.4

Source: West Virginia Department of Mines.

TABLE 8

NUMBER OF FIRMS AND TOTAL EMPLOYMENT IN THE MANUFACTURING SECTOR, BY SIC MAJOR INDUSTRY GROUP
POCAHONTAS AND RANDOLPH COUNTIES, 1978

SIC Group	Industry	Randolph County Firms	Randolph County Employment	Pocahontas County Firms	Pocahontas County Employment
20	Food and Kindred Products	-	-	1	6
22	Textile Mill Products	2	133	-	-
24	Lumber and Wood Products	19	402	6	128
25	Furniture and Fixtures	2	149	-	-
27	Printing and Publishing	4	36	1	5
30	Rubber and Misc. Plastic Products	1	180	-	-
31	Leather and Leather Products	-	-	3	355
32	Stone, Clay and Glass Products	4	84	1	3
33	Primary Metal Industries	2	162	-	-
34	Fabricated Metal Products	1	8	-	-
35	Machinery	1	4	-	-
38	Professional, Scientific and Controlling Instruments, etc.	1	75	-	-
39	Misc. Manufacturing Industries	1	2	-	-
	Total	37	1,235	12	497

Source: West Virginia Manufacturing Directory, 1978.

f. Local Government Revenues

In 1979, over $3.5 million in taxes were levied on real, personal, and public utility property in the two-county area (Table 9). Of other general revenue sources, revenue-sharing monies are the most important, followed by payments from the U.S. Bureau of Land Management and the Forest Service, and, for Randolph County, Coal Severence Tax receipts. The BLM payments are made under the terms of the 1976 Payment-in-Lieu of Taxes (PILT) Act, which provides for compensation on an "entitlement" acre basis for National Forest and other public lands. Counties having land administered by the Forest Service also benefit from the "25 percent fund" which is derived from sales of timber, mineral leases, and special use permits (Table 10).

g. Economic Development Plans, Priorities, and Constraints

The principal objective of economic development strategies for both counties, and for the region as a whole, is the creation of additional employment opportunities. Planners concerned with Randolph County look to growth in wood products and other manufacturing industries, coal support services activities, tourism, and white collar businesses to generate new jobs. With the exception of coal-related industry, similar industrial targets have been set for Pocahontas County.

Most of the initial growth is expected to occur in and around Elkins and Marlinton. By virtue of its proximity to redevelopment areas, its size and growth potential, and its service and infrastructure facilities, Elkins has been designated as one of two primary Economic Development Centers (EDC's) by the Region 7 Council, whereas Marlinton qualifies as a tertiary center for Region 4 on the basis of these same EDA criteria.* In addition to the industrial park developments underway in both centers, area attractions are thought by local and regional planning authorities to include a sizeable skilled labor supply; an abundance of mineral, forest, and recreation resources; Elkins' airport, schools and college, and medical facilities; and the area's geographic location in what is described as the "hub" of the nation's economic and industrial base.

Various other factors associated with the counties' geographic location are perceived as economic development constraints. Key among these are poor transportation access to and from the national interstate highway network and, particularly in Pocahontas County, a scarcity of available land with slope and soil conditions appropriate for industrial uses. A shortage of adequate housing facilities and insufficient water and sewer system infrastructure also limit the area's potential for economic growth.

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* All 12 counties in Regions 4 and 7 have been designated as Redevelopment Areas by the U.S. Economic Development Administration (EDA) based on their substantial and persistent unemployment, low median family incomes, and/or other qualifying conditions. Locales classified as primary, secondary, or tertiary Economic Development Centers for Redevelopment Areas are entitled to project funding consideration by the EDA. Other primary Centers in the 12 county region are Weston in Lewis County (Region 7), Fayette-Plateau in Fayette County (Region 4), and Greenbrier Valley in Greenbrier County (Region 4).

TABLE 9

TAXES LEVIED ON CLASSIFIED ASSESSED VALUATIONS
POCAHONTAS AND RANDOLPH COUNTIES, 1979

	Randolph County	Pocahontas County	Total	Percent of Total
	- - - - 000's omitted - - - - - -			
Class I (agricultural personal property and products)	$ 83.0	$ 29.3	$ 112.3	3.2%
Class II (owner-occupied residential property and farms)	360.8	217.0	577.8	16.2%
Class III (other property located outside municipalities)	1,454.3	563.0	2,017.3	56.6%
Class IV (other property located inside municipalities)	720.4	135.8	856.2	24.0%
Total	$2,618.5	$945.1	$3,563.6	100.0%

Source: West Virginia Blue Book, 1979.

TABLE 10

RECEIPTS FROM U.S. FOREST SERVICE AND BUREAU OF LAND MANAGEMENT, BY SOURCE
POCAHONTAS AND RANDOLPH COUNTIES, FY 1971-1980

Year and Source	Pocahontas County	Randolph County
FY 1971-FY 1976 Average		
"25 Percent Fund"	$ 42,790	$ 26,277
FY 1977		
"25 Percent Fund"	$ 32,963	$ 20,299
PILT	184,979	113,906
Total	$217,942	$134,215
FY 1978		
"25 Percent Fund"	$ 39,503	$ 24,463
PILT	204,938	126,197
Total	$244,441	$150,660
FY 1979		
"25 Percent Fund"	$ 49,130	$ 30,397
PILT 1/	188,529	116,746
Total	$237,659	$147,143
FY 1980		
"25 Percent Fund:	$ 60,871	$ 37,701
PILT 1/	$212,231	$131,304
	$273,102	$169,005

1/ PILT payments for FY 1979 were made at 87.676 percent of the computed amount due to inadequacy of funds. FY 1980 funding was at 98.5% of amounts computed at $0.75/acre.

Source: U.S. Forest Service.

In the economic development plans for the two-county area, it is anticipated that completion of Appalachian Development Highway Corridors H and L and some upgrading of the area's major north-south trunklines will minimize problems of transportation access. Housing and community infrastructure deficiencies are being addressed by various Federally-funded projects aimed at rehabilitating the existing housing base and constructing or improving water supply and sewerage disposal facilities in areas of population concentration. Priority is also being given to upgrading downtown Elkins and Marlinton, expanding the supply of recreational, health, and related service facilities, and other community-oriented projects. It is hoped that improvements designed to make the two-county area a more attractive place to live will have at least an incidental effect on local jobs-creation prospects.

h. Summary and Conclusions

The two-county area that would be most immediately affected by the proposed Scenic Highway Extension project may be described as predominantly rural, relatively isolated, and historically dependent on natural resource exploitation to sustain its population and economy. Until recently, it showed all the symptoms of an area in severe economic decline--high rates of out-migration, an aging population base, falling levels of employment in productive sectors of the economy, low personal incomes relative to state and national averages, and, in agriculture, a high proportion of marginal farming operations. In the past few years, however, signs of revitalization have appeared in the form of population growth, a resurgence of activity in the mining sector, and new investments in industrial parks, community facilities and services, and supporting infrastructure. Planners predict a continuation of these trends, subject to completion of the Appalachian Development Highway network, rising levels of demand for coal and wood products, and aggressive economic development and investment promotion actions on the part of state and local governments.

6. Land Use

Land use patterns in the study area have been primarily shaped by the rugged mountainous topography, abundance of natural resources, especially coal and timber, and the economic activities related to the extraction of these resources. The area is relatively isolated and rural with extensive open space, difficult access for transportation, and an economy dependent on exploitation of the natural resources.

The following land use categories are used to identify existing land uses. In Section V, these categories are also used to discuss land use impacts for the four build alternatives and the no-build alternative:

- residential
- commercial
- industrial
- public/cultural facility
- agricultural
- mineral extraction
- open space/recreation

In Pocahontas and Randolph Counties, most of the residential, commercial, industrial and public/cultural facilities land uses are located in relatively small incorporated and unincorporated towns and villages. These land uses also tend to be scattered along the roadways of the area, usually close to the more populated areas. Seasonal or vacation homes are a residential land use of significance and exists primarily outside of the towns and villages. It is anticipated that the amount of land in these four categories will continue to increase along with the projected growth expected to occur, especially in the larger towns such as Marlinton and Elkins.[2 3]

Agriculture is limited in the study area by the topography and soils. The major agricultural activity is livestock grazing. Grazing occurs in the area south of Thorny Flat, on the lower slopes west of Cheat Mountain, east of Back Allegheny Mountain and along the Tygart Valley and Greenbrier Rivers. In the future, it is anticipated the amount of land devoted to agriculture will decrease due to agricultural economic factors and the growth of the towns and villages.

Mineral extraction is a significant land use in the northern portion of the study area in Randolph County. Coal mining and processing are the main activities in this land use category. Mineral extraction and timber harvesting operations occur near many of the open space/recreation lands and special measures are required to assure compatibility between these two conflicting land uses.

Open space/recreation land use is also evident within the study area, and includes dispersed recreation activities such as hunting, fishing, hiking, scenic viewing and picnicking, as well as developed recreational activities at the Snowshoe Ski Resort and the Cass Scenic Railroad. The amount of land available for open space/recreation land use is expected to increase in the future as lands are converted from agricultural uses and siliviculture.

7. <u>Transportation System</u>

a. <u>Highway</u>

1) <u>Existing System</u>

The highway system in this part of West Virginia has been limited by the mountainous terrain, and most of its development has occurred in the north-south river valleys. The counties of Pocahontas and Randolph are served by widely spaced two-lane rural arterials, collectors, and one-lane local roads. No interstate routes or expressways exist in the two-county area. The nearest interstate highways are I-81, 55 miles to the east, I-64, 48 miles to the south, and I-79, 42 miles to the west*(Figure 1). These interstate routes connect the region with other regions.

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*Straight Line Distance - measured from the center of the project area to the nearest point on the Interstate Route.

Rural arterial highways that surround the project area include U.S. Routes 250 and 219 and West Virginia Routes 28/92 and 39. These connect the project area with the Interstate system; and with population concentrations in the region (See Figures 1 and 3). These highways mainly serve relatively low volumes of intra-regional and local travel rather than inter-regional travel. Commercial truck and recreational traffic constitutes significant portions of the total volumes of traffic on these roads, and these types of traffic compound operational and safety hazards caused by poor geometrics. Utilizing traffic count data provided by the West Virginia Department of Highways, the amount of truck traffic on major highways in the project area has been estimated at about 10%.** These rural arterials are fairly well maintained, but geometric problems, severe horizontal and vertical alignments, and curves, exist throughout because of the rugged terrain.

Roads in the project area with lower functional classifications, collectors, and local service roads, are shown on Figure 3 and include West Virginia Secondary Route 1 or Back Mountain Road, West Virginia Secondary Route 7 or Cass Road, and West Virginia Secondary Routes 9 and 1/3 or Linwood Road. These roads mainly serve very low volumes of local and recreational traffic and for the most part are one-lane wide. A portion of the Linwood Road is an unpaved gravel road.

The West Virginia Department of Highways identifies the worst accident locations, those in the 99th precentile, by comparing accident rates on similar highways throughout the state. These are included in the annual "Critical Rate Sections" Report. Only one location in Pocahontas and Randolph Counties is indicated in the 1979 Report. This is the last three quarters of a mile on the four lane section of U.S. Route 219/250 just south of Elkins. Since the designation of critical rate sections is based on the actual number of accidents which have occurred, this is the only section identified in the two-county area included in the 1979 Report. This, however, is not a clear indication of the number of areas with high accident potential or hazardous road geometrics in the two-county area. It is more indicative of the relatively low traffic volumes in the area. Much of the funding for highway safety improvements in West Virginia is based on the designated critical rate sections. Currently, because so few of these sections are indicated for Pocahontas and Randolph Counties, this area receives little funding for safety improvements of highways.

2) Improvements

Various improvements along with normal maintenance operations are planned for roads in the area and will be discussed in Section IV.B. The most significant planned improvement other than the Highland Scenic Highway is the Interstate Appalachian Development Highway Corridor H which would be an east-west route connecting I-79 and I-81 and traversing the U.S. Route 33 corridor through northern Randolph County.

**Data used was from vehicle classification counts taken between 1977 and 1980 at six major intersections near the project area between the hours of 7 and 11 am and 2 and 6 pm. Pick up and panel trucks were not considered as trucks in this estimation of truck traffic. At individual intersections percent of truck traffic varied between 8% and 14%.

The Appalachian Development Highway for Corridor H, extending from I-79 at Weston eastward through Elkins, along the present location of U.S. Route 33, and eventually to I-81 and I-66 near Front Royal, Virginia will provide improved access into the Monongahela National Forest on an east-west axis. Portions of U.S. Route 33 have already been improved at the western end and in the vicinity of Elkins. This corridor is approximately 25 miles north of the terminii on U.S. Route 250 for proposed extensions of the Highland Scenic Highway. When completed, the Appalachian Development Highway in Corridor H will be an important access route to the Highland Scenic Highway. The Appalachian Development Highway in Corridor L, U.S. Route 19 connecting to I-79, near Sutton, and extending south to Beckley, is approximately 40 miles west of the study area.

3) Forest Road System

In the Monongahela National Forest, there are approximately 600 miles of roads, most of which are of single lane width, maintained by the Forest Service. The Forest Service roads that are open to the public are generally used for recreational purposes. Some 2,000 miles of roads will ultimately be needed to manage the Forest resources.[1]

4) Private Roads

An extensive system of private roads exists in the northern portion of the study area, particularly on land owned by the Mower Lumber Company. These roads are primarily used to facilitate timbering and coal mining operations; however, with permission, they may be used for access into the area for recreational purposes. Since these roads are generally intended for only temporary use to access natural resources in the area, they are constructed to very low standards and receive only minimal maintenance.

b. Bus/Taxi

No public bus or rural transit system operates in the area. Scheduled intercity bus service does exist from Marlinton south and two taxi companies operate out of Elkins.

c. Railroad

In addition to the goods movement that occurs on the area's highway system, a significant portion is transported via the area's railroads. The project area is served by freight-only branches of the Western Maryland Railroad. The Durbin branch of the Western Maryland Railroad extends north from Durbin to Elkins. The Webster Springs branch enters the study area from the west, crosses U.S. Route 219 and Cheat Mountain near Mace, and then follows the Shavers Fork northward. This branch joins the Durbin branch tracks north of the study area and continues to Elkins.

Forest products and coal are the two major products transported by rail in this area. The railroad provides carload service for bulk shippers, and spurs are provided along both branches.

d. Air

The nearest commercial airport is in Elkins, served by scheduled commuter service.

8. Public Utilities, Facilities and Emergency Services

Due to the rural, undeveloped nature of the study area, the existence of public utilities, facilities and emergency services is minimal. Populated portions of the immediate study area, at the Snowshoe resort area and along Secondary Route 9, are serviced by public electric and phone utilities. There are, however, no public gas, water, or sewer systems within the immediate study area. These systems do exist along with more extensive electric and phone systems in Randolph and Pocahontas Counties in some of the towns and villages. The project area is served by police, fire, and ambulance service, however, travel distances to some portions of the study area are great and, as a result, response times are inadequate.

Forest fires are fought by the West Virginia Department of Natural Resources on privately owned land and by the Forest Service on U.S. owned land. Forest fires, however, are not a significant threat in the area because of moist conditions.

There are no educational or religious facilities in the immediate study area, but they do exist outside of this area along roads and in some of the villages and towns.

9. Tourism Resources and Markets: Base Case Assessment

a. Introduction

This base case assessment focuses on existing resources for tourism development and current tourist markets within a "zone of influence," defined for the analysis, in which some impacts of the Highland Scenic Highway and its proposed extension could reasonably be expected. The "zone of influence" consists of 13 counties in the mid-section of West Virginia's mountain highlands and comprises the majority of the Potomac Highland and New River Travel Councils designated by the State of West Virginia (Figures 7 and 8).

b. Tourism Resources

(1) Access

Although heavily populated areas of Pennsylvania, Maryland, and Virginia are nearby, access to the study zone is poor. At present, the area's only high-speed, divided highway is I-64, connecting Greenbrier County with I-81 at Lexington, Virginia and planned eventually to meet the West Virginia Turnpike (I-77). Travelers originating in the east and destined for points to the north of Greenbrier County must cross the mountains on two-lane highways characterized by steep grades and numerous switchbacks. Those approaching from Charleston and points west can take I-79 to within 30 to 50 miles of the zone's western perimeter, beyond which they, too, must travel over hazardous, two-lane mountain roads. (Figure 1)

Completion of the Appalachian Development Highway system, particularly Corridor H linking I-79 near Weston, West Virginia with I-81 and I-66 near Strasburg, Virginia, would cut travel time from the Baltimore-Washington area by an hour or more each way. However, the full length of Corridor H will not be open for at least 15 years. In the meantime, difficult access must be viewed as a significant tourism constraint.

(2) Attractions

Sightseeing and outdoor recreation are the premier attractions. Within the 13-county zone of influence are West Virginia's highest mountains, its two principal ski areas, nine of 14 State Vacation Recreation Areas, and 60 percent of the total acreage in the State Parks and Forests system. The Monongahela National Forest represents 17 percent of all land area in the study zone.

An inventory of principal attractions prepared for a preliminary study* highlighted the importance of State and Federal Government agencies in developing the region's tourism resources. Of 46 attractions and facilities included in the listing, only 13 are run by private interests. All others, from primitive hiking trails to highly developed ventures like Cass Scenic Railroad, are publicly owned and operated. State Parks and Forests offer facilities for hiking, fishing, picnicking, and usually also swimming, boating, tennis, and other active pursuits. Two State Parks (Pipestem and Canaan Valley) offer golf; one (Canaan Valley) is a major winter sports center. The National Forest Service emphasizes opportunities for hiking, backpacking, hunting, fishing, nature study, and other forms of "dispersed" recreation on the Monongahela National Forest. More selectively, swimming, boating, and observation sites have been developed, the most important at Lake Sherwood and Spruce Knob. The Forest Service also operates visitor centers at Cranberry Mountain and Seneca Rocks.

Other major facilities for outdoor recreation include two U.S. Corps of Engineers impoundments, at the Summersville and Bluestone Dam site areas, which offer 4,700 surface acres for water-based recreation; and two private enterprises, the Snowshoe ski resort and The Greenbrier golf resort and thermal spa. The West Virginia highlands also afford exceptional opportunities for hunting (deer, black bear, and various small game species), white water rafting, rock climbing, spelunking, and other specialized recreational activities.

Natural, scenic, and historic attractions include sightseeing caverns; Cass Scenic Railroad (a restored lumber village), Grandview Park with its outdoor historical drama production, and Civil War battlefields at Droop Mountain and Carnifex Ferry, all part of the State Park system; Pearl Buck's Birthplace and Historical Museum in Pocahontas County; and the Old Stone Church and other restored buildings in Lewisburg. An Exhibition Coal Mine in Beckley and the National Radio Astronomy Observatory in Greenbank (Pocahontas County) provide tours during late spring, summer, and early fall. This seasonal operating pattern is typical.

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* See Highland Scenic Highway Study, Working Paper No. 3, pp. 53-56.

On the Monongahela National Forest, the Forest Service has identified more than 60 "Special Interest Areas." Among the more important are Cranberry Glades, where visitors may see flora and fauna typical of northern bog habitats; the Hills Creek Falls Scenic Area with its three giant waterfalls; and the Gaudineer Scenic Area with its unique expanses of virgin red spruce timber forest. All three areas are accessible by interpretative nature trail. The Forest Service also lists some 550 miles of State and Forest roads as being of outstanding scenic attraction, and anyone driving through the region is likely to travel over countless additional miles that might be similarly classified.

Not listed in the inventory, but of interest to tourists, are at least five covered bridges, two National and four State hatcheries, nine Public Hunting and/or Fishing areas, and a variety of festivals and special events which help to smooth seasonal peaks in visitation.

(3) Visitor Accommodations

Listed overnight accommodations in the 13-county zone of influence include 92 facilities containing 3,583 units (Table 11). About half of the available units are in transient hotels and motels offering few amenities other than rooms--at best, a restaurant and swimming pool for the entertainment of their guests. The balance is associated with vacation resort operations providing a full complement of facilities for indoor and outdoor recreation.

The average hotel/motel is locally owned and operated and has less than 25 units. Of the 81 hotels and motels, only three are affiliated with national chains and only one--the 204-room Ramada Inn in Beckley--has over 100 units. About half of all units are concentrated either in and around the municipalities of Beckley (Raleigh County) and Elkins (Randolph County) or in the vicinity of I-64 in Greenbrier County.

West Virginia State Parks or Forests contain nine of the 11 resort facilities. The largest are the 250-room Canaan Valley Lodge and Convention Center in Tucker County and the 143-room Pipestem Resort in Summers County.

The two privately-run resorts--The Greenbrier and Snowshoe--together represent 61 percent of all units in the resort category, and nearly 30 percent of all available units in the zone. With 650 units and 429 units respectively, they are also the two largest and best-equipped lodging facilities in the entire state.

Additionally, there are 52 listed campgrounds (Table 12), ranging from fairly primitive to full-service operations with electric and water hookups, food and laundry service, and resort-style recreational facilities. One-third of the campgrounds, but nearly two-thirds of available sites, are privately owned and operated. Publicly-owned facilities, managed by the State Department of Natural Resources, the U.S. Forest Service, or the Army Corps of Engineers, are generally more spartan than privately-run facilities. About half of the area's campgrounds remain open year-round. Others close during the late fall and winter months and open again in April or May.

TABLE 11

ZONE OF INFLUENCE LODGING INVENTORY, BY COUNTY

County	Hotels/Motels		Resorts/Cabins		Total	
	Facilities	Units	Facilities	Units	Facilities	Units
ZONE OF INFLUENCE						
Pocahontas	12	188	2	462 1/	14	650
Randolph	12	209	-	-	12	209
Fayette	6	155	1	25	7	180
Grant	7	139	-	-	7	139
Greenbrier	12	305	2	662	14	967
Hardy	3	41	1	24	4	65
Monroe	1	6	-	-	1	6
Nicholas	3	57	-	-	3	57
Pendleton	6	131	-	-	6	131
Raleigh	6	402	-	-	6	402
Summers	-	-	2	193	2	193
Tucker	8	157	2	345	10	502
Webster	5	73	1	9	6	82
Subtotal	81	1,863	11	1,720	92	3,583
OTHER WEST VIRGINIA	183	9,290	7	623	190	9,913
Total	264	11,153	18	2,343	282	13,496

1/ Includes 279 rental condominiums, townhouses, and private homes at Snowshoe Resort in Slatyfork.

Source: West Virginia Hotels and Motels, West Virginia Governor's Office of Economic and Community Development, Travel Development Division, and Checchi and Company.

TABLE 12

ZONE OF INFLUENCE CAMPGROUND INVENTORY, BY COUNTY AND TYPE OF OWNERSHIP

County	Private		Public		Total	
	Facilities	Sites	Facilities	Sites	Facilities	Sites
ZONE OF INFLUENCE						
Pocahontas	1	29	6	131	7	160
Randolph	2	282	3	23	5	305
Fayette	-	-	2	85	2	85
Grant	2	70	2	57	4	127
Greenbrier	2	246	4	173	6	419
Hardy	2	525	1	15	3	540
Monroe	-	-	-	-	-	-
Nicholas	2	167	4	152	6	319
Pendleton	3	180	4	91	7	271
Raleigh	-	-	-	-	-	-
Summers	2	220	2	141	4	361
Tucker	1	48	6	153	7	201
Webster	-	-	1	88	1	88
Subtotal	17	1,767	35	1,109	52	2,876
OTHER WEST VIRGINIA	43	3,318	24	1,062	67	4,380
Total	60	5,085	59	2,171	119	7,256

Source: Camping in West Virginia; West Virginia Governor's Office of Economic and Community Development, Travel Development Division; and U.S. Forest Service.

Table 12 does not include the four organization camps and 20 primitive trail shelters operated by the Forest Service on the Monongahela National Forest. Nor does it encompass an estimated 300 undeveloped sites along Forest streams and roads which attract campers and their vehicles. The Forest Service describes indiscriminate camping at these sites, most of which are environmentally unsuitable for intensive recreational use, as one of its most pressing recreation problems on the Forest.*

(4) Future Development Projects

Several Federal Government programs are in various stages of implementation. Perhaps most significant to tourism is the authorized New River Gorge National River in Fayette, Raleigh, and Summers Counties. Designated as an element of the National Park System in 1978, this project will provide one of the largest publicly-owned outdoor recreation complexes in the eastern United States.

The Forest Service's Land Acquisition Program assigns top priority to the Spruce Knob-Seneca Rocks National Recreation Area, where an additional 19,000 acres have been recently acquired to meet anticipated demand for various recreational activities through 1985. New (Levels 2 and 3) recreational facilities will be constructed here over the near-term future. Elsewhere, the current Recreation Management Plan emphasized rehabilitation of existing facilities and provision of new opportunities for the more primitive forms of dispersed recreation--hiking, backpacking, hunting, fishing, and similar activities.

The Greenbrier, Gauley, Cranberry, Meadow, and Bluestone Rivers are presently under study for possible inclusion in the federal Wild and Scenic Rivers System.

Two proposed private development projects--the Davis Power Project and the Snowshoe expansion--could also have significant tourism impacts. Monongahela Power Company plans a 7,000 surface acre impoundment on the Blackwater River near Davis (in the Canaan Valley) which would be used for pumped power storage and water-based recreation. Strong opposition on environmental grounds has delayed the project, and it is uncertain at this time that an acceptable compromise will be reached.

The Snowshoe Resort plans development of new lodges, condominiums, chair lifts, and ski trails on a phased basis subject to market conditions and the availability of financing. The Snowshoe Resort also plans to provide an 18-hole championship golf course to attract meetings, conventions, and other tourist traffic outside the winter skiing season.

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* See U.S. Forest Service, Monongahela National Forest Recreation Management Plan, Calendar Year 1978.

c. Tourism Markets

(1) Travel to West Virginia

According to the 1977 National Travel Survey (NTS), nearly 5.9 million households traveled to or through West Virginia on trips of 100 miles or more (Table 13). These household trips represented 11.9 million person-trips and produced 14.4 million individual overnight stays in the state. Roughly one-third of the trips were bound for destinations in West Virginia, and most of these (about one-quarter of all trips) originated out of state. The remaining travelers simply passed through West Virginia en route to another destination, seldom pausing overnight. About 85 percent of trips involving an overnight stay occurred with a destination trip to West Virginia and most originated out of state.

Trips to West Virginia destinations (Table 14) were taken primarily by car or truck, often with camping equipment. Outdoor recreation was the principal trip purpose for more than one-fifth of this destination travel. Over two-thirds of trips were taken in the spring and summer. Most trips originated fairly nearby; about one-fifth in West Virginia itself, one-third in other parts of George Washington Country region, and one-fifth to one-quarter in Great Lakes Country. Weekend and vacation trips each accounted for over 40 percent of West Virginia destination travel.

The characteristics of travelers to West Virginia are generally similar to those of travelers nationally (Table 15). Median family income of households making trips to West Virginia destinations ($20,051) is about $1,000 higher than that for all travel to or through West Virginia ($19,020) and $2,000 higher than the national median ($17,811). Relatively high proportions of professional/managerial and blue collar workers among travelers to West Virginia would seem to reflect the heavily industrialized economic base of market-generating states.

Travelers to West Virginia are generally similar in age to other U.S. travelers, but overall have a slightly lower educational level. They are more likely to live in a small metropolitan area or outside the metropolitan complexes. As is true nationally, the majority of travelers to West Virginia destinations are male (55 percent). When pass-through traffic is included, however, sex distributions among all travelers in the state are almost exactly equal, perhaps reflecting the low proportions in this group who travel for business purposes and outdoor recreation (Table 15).

(2) Travel to the Study Zone

(a) Monongahela National Forest

The Forest Service estimates that 1.2 million visitor-days were spent in Monongahela National Forest during fiscal year 1980 (Table 16). Most popular activities were camping (36 percent of all days), auto-driving (17 percent), hunting (14 percent), and fishing (12 percent).

TABLE 13

TRAVEL TO OR THROUGH WEST VIRGINIA
ON TRIPS OF 100 MILES OR MORE AWAY FROM HOME

	Household Trips		Person-trips		Person Nights 1/	
	Number (000)	Percent	Number	Percent	Number	Percent
All travel to or through West Virginia	5,891	100.0	11,919	100.0	14,407	100.0
Trips to West Virginia destinations	1,943	33.0	3,670	30.8	12,291	85.3
Originated in West Virginia	382	6.5	736	6.2	1,424	9.9
Originated in another state	1,561	26.5	2,934	24.6	10,867	75.4
Trips to other destinations 2/	3.948	67.0	8,249	69.2	2,116	14.7
Spent night in West Virginia	506	8.6	1,159	9.7	2,116	14.7
Passed through	3,442	58.4	7,090	59.5	-	-

1/ Nights spent in West Virginia.
2/ Includes trips to destinations outside the United States.

Source: 1977 National Travel Survey, Bureau of the Census, U.S. Department of Commerce.

TABLE 14

SELECTED TRIP CHARACTERISTICS
TRAVEL TO WEST VIRGINIA DESTINATIONS COMPARED WITH
ALL TRAVEL TO AND THROUGH WEST VIRGINIA AND ALL TRAVEL BY U.S. HOUSEHOLDS

(All figures in percent unless otherwise noted)

	Person-trips		
	Travel to West Virginia Destinations	Travel to and through West Virginia	All Travel by U.S. Households
MAJOR-MEANS OF TRANSPORTATION			
Auto/Truck without Camping Equipment	73.5	83.3	76.2
Auto/Truck with Camping Equipment	12.6	9.6	5.7
Bus	2.3	0.9	2.8
Train	0.9	0.3	0.8
Airplane	9.6	3.3	12.2
Other	0.3	0.1	0.7
Different Means Going and Coming	0.9	0.3	1.6
MAIN PURPOSE OF TRIP			
Visit Relatives or Friends	38.3	44.2	36.8
Business	12.8	9.6	17.6
Convention	1.4	1.4	2.0
Outdoor Recreation	21.4	11.1	13.1
Entertainment	5.9	5.0	7.7
Sightseeing	3.5	8.6	5.2
Other	16.7	20.1	17.6
DURATION OF TRIP			
Day Trip	17.8	9.5	18.7
1 - 3 Nights	50.2	38.0	52.3
4 - 9 Nights	23.7	31.1	20.1
10 or More Nights	8.3	21.4	9.0
Mean	4.1	7.1	4.0
Median	2.7	4.4	2.6
TIMING OF TRIP			
Quarter 1	17.7	16.7	23.2
Quarter 2	32.8	27.0	25.9
Quarter 3	38.2	39.1	30.9
Quarter 4	11.2	17.1	20.0
REGION OF ORIGIN			
New England	1.4	2.2	4.4
Eastern Gateway	7.7	7.8	8.2
G. Washington Country	57.7	54.3	9.9
South	8.6	8.9	17.9
Great Lakes Country	22.2	23.2	23.7
Mountain, Frontier, Far West	2.5	3.6	36.0
Trip Originated in this State	20.1	23.9	-
OTHER CHARACTERISTICS			
Weekend Trip	44.5	33.0	40.5
Vacation	43.1	55.7	37.0
Persons on Trip (mean number)	2.6	2.8	2.4
Round Trip Distance (median miles)	435	n.a.	386

Source: 1977 National Travel Survey, ibid.

TABLE 15

SELECTED TRAVELER CHARACTERISTICS
TRAVEL TO WEST VIRGINIA DESTINATIONS COMPARED WITH
ALL TRAVEL TO AND THROUGH WEST VIRGINIA AND ALL TRAVEL BY U.S. HOUSEHOLDS.

(All figures in percent unless otherwise noted)

FAMILY INCOME			
Under $10,000	17.2	16.5	18.8
$10,000 to $24,999	53.5	56.1	55.3
$25,000 and Over	29.3	27.3	25.9
Median	$20,051	$19,020	$17,811
OCCUPATION OF HOUSEHOLD HEAD			
Professional or Managerial	48.1	41.4	n.a.
Sales or Clerical	5.4	8.2	
Blue-Collar	27.4	28.9	
Service	0.7	1.7	
Farm	1.0	0.9	
Retired	9.0	8.5	
Other, incl. unemployed	8.4	10.4	
AGE OF TRAVELER			
Under 18 Years	23.5	26.0	21.5
18 to 34 Years	32.8	30.6	31.6
35 to 54 Years	26.2	25.7	30.4
55 Years and Over	17.5	17.6	16.9
Median	31.0	30.6	32.5
EDUCATION OF TRAVELER			
Elementary School or Less	28.3	29.1	23.1
High School	32.8	37.4	38.0
College	38.9	33.5	38.9
AREA OF RESIDENCE			
In an SMSA[1/] Under 1,000,000	25.0	24.1	31.8
In an SMSA[1/] 1,000,000 and Over	35.4	30.9	37.8
Not in an SMSA	39.6	45.0	30.3
SEX OF TRAVELER			
Male	55.4	50.3	54.8
Female	44.6	49.7	45.2

[1/] An SMSA (Standard Metropolitan Statistical Area) is made up of a central city of at least 50,000 persons and the surrounding metropolitan county or counties.

Source: 1977 National Travel Survey, ibid.

TABLE 16

RECREATION USE STATISTICS (PRELIMINARY)
MONONGAHELA NATIONAL FOREST, FISCAL YEAR 1980

(Thousands of Visitor Days)

District	Camp	Picnic	Hunt	Fish	Swim	Hike & Walk	View Outstanding Scenery	Auto-Drive Motor	Scooter Motor	Rock Climb	Other	Total
Cheat	42.0	8.2	36.6	22.5	6.1	12.9	1.2	26.5	2.6	-	16.5	175.1
(Otter Creek Wilderness)	(5.1)	-	(3.8)	-	-	(3.0)	-	-	-	-	(.7)	(12.6)
Gauley 1/	110.1	9.1	11.4	54.1	1.6	35.9	.3	40.5	1.1	-	20.9	285.0
(Cranberry Wild & Scenic Area)	(9.1)	-	(2.6)	(.1)	-	(18.3)	-	-	-	-	(.3)	(30.4)
Greenbrier	36.3	2.1	38.2	20.6	.9	8.8	.2	42.6	.5	-	27.2	177.4
Marlinton	34.4	3.9	22.6	12.4	.3	5.4	.1	27.0	2.4	-	6.0	114.5
Potomac	103.6	5.5	27.6	29.2	.6	17.5	1.8	41.6	4.9	1.4	6.6	240.3
(Dolly Sods Wildnerness)	(8.2)	-	(6.7)	(.2)	-	(6.5)	-	-	-	-	(.5)	(22.1)
(NRA) 2/	(66.1)	(5.1)	(6.8)	(22.5)	(.6)	(8.5)	(1.6)	(25.8)	(.6)	(1.4)	(4.5)	(143.5)
White Sulphur	111.7	11.2	30.2	11.1	5.2	5.5	.2	32.6	1.7	-	11.8	221.2
Forest Totals	438.1	40.0	166.6	149.9	14.7	86.0	3.8	210.8	13.2	1.4	89.0	1,213.5
% of Total Forest Use	36%	3%	14%	12%	1%	7%	Less than (1%)	17%	1%	Less than 1%	7%	100%

( ) Special Areas which are included in Total Distribution Figures.
1/ High use on Gauley R.D. attributed to Rainbow Family Gathering during the end of June and first week of July.
2/ NRA figures include use at Spruce Knob Lake and Campground.

The most visited Forest Service Ranger District was Gauley (285,000 visitor-days) which was the site of the Rainbow Family Gathering in late June and early July. Greenbrier and Marlinton Districts, through which the proposed Highland Scenic Highway extension would pass, recorded far less usage, respectively 177,400 and 114,500 visitor-days. In Greenbrier District, most popular activities were auto-driving (24 percent of visitor-days), hunting (22 percent), and camping (20 percent). The same activities also led in Marlinton District, although proportions were somewhat different: camping (30 percent), auto-driving (24 percent), and hunting (20 percent).

Cranberry Mountain Visitor Center, situated in Pocahontas County near the entrance to the Highland Scenic Highway, hosted approximately 21,000 visitors in fiscal year 1980 (Table 17). Although visitation in 1979 and 1980 was significantly lower than previous years, Forest Service personnel generally expect an upturn when a new exhibit under design is put into place in the fall of 1981.

The new Seneca Rocks Visitor Center, situated near the boundary between Randolph and Pendelton Counties, recorded about 41,000 visits in the 1980 fiscal year.

Both Visitor Centers operate seasonally: they are open seven days a week from Memorial Day through Labor Day; on weekends only from May 1 until Memorial Day and from Labor Day until closing (October 15 at Cranberry Mountain, November 30 at Seneca Rocks). At Cranberry Mountain, nearly three-fourths of all visits occur in the months of June, July, and August. Seneca Rocks receives about 60 percent of visits in these months, with another 15 percent in October when fall foliage is at its peak.

The Cranberry Mountain Visitor's Register, representing about 75 percent of all visitors, shows a high proportion of West Virginians (65 percent). No other home state represented as much as 10 percent of signers (Table 18). Sightseeing, mentioned by 57 percent of registrants, was overwhelmingly the most popular activity. Other favored pursuits were camping (21 percent), nature study (21 percent), hunting and fishing (13 percent), hiking (12 percent), and picnicking (10 percent). Less frequently mentioned were such special interest sports as spelunking (0.5 percent), white water canoeing (0.3 percent), and rock climbing (0.1 percent).

(b) State Parks

The 17 State Parks and State Forests within the 13-county zone of influence defined for this study in combination received 4.1 million visits during 1979, or well over half (58 percent) of the 7.1 million visits to all State Parks and State Forests in West Virginia (Table 19). Most visited State Parks were Pipestem (over one million visits); Hawks Nest (617,000); Canaan Valley (498,700); Blackwater Falls (432,000); and Grandview (414,000). The five facilities in Pocahontas and Randolph Counties together registered about 230,000 visits in 1979: 114,000 at Watoga State Park, 64,000 at Cass Scenic Railroad, 34,000 at Droop Mountain, and 20,000 at Kumbrabow State Forest.

TABLE 17

MONONGAHELA NATIONAL FOREST VISITOR CENTER USE

(Thousands of Visits)

	Cranberry Mountain		Seneca Rocks 1/
	Fiscal Years	Calendar Years	Fiscal Years 2/
1980	21.0	n.a.	41.3
1979	19.9	n.a.	38.2
1978	23.3	22.8	29.7
1977	24.8	24.8	-
1976	26.0	26.0	-
1975	23.3	25.1	-

1/ The Seneca Rocks Visitor Center opened on June 19, 1978.
2/ Fiscal years ending September 30.

Source: U.S. Forest Service.

TABLE 18

VISITOR CHARACTERISTICS
MONONGAHELA NATIONAL FOREST, CRANBERRY MOUNTAIN VISITOR CENTER

PERCENT OF VISITORS SIGNING THE VISITORS' REGISTER

Total number of visitors signing the register	16,991
Total number of visitors by desk punch count	22,777
Percent of desk punch count attendance signing register	75%

DATA OBTAINED FROM THE VISITORS' REGISTER

Visitors' Home States	Number	Percent
West Virginia	11,044	65.0
Ohio	1,247	7.3
Maryland	605	3.5
Virginia	1,035	6.0
Pennsylvania	622	3.6
Other States	2,412	14.2
Foreign Countries	68	0.4
Total	16,991	100.0

Visitors' Number of Visits	Number	Percent
First Visit	5,941	35.0
Second or More Visits	2,718	16.0
No Entry	8,325	49.0
Total	16,984	100.0

Visitors' Activities 1/	Number	Percent
Sightseeing	9,695	57.0
Camping	3,536	21.0
Hiking	2,288	12.0
Nature Study	3,668	21.0
Picnicking	1,807	10.0
Hunting and Fishing	2,306	13.0
Spelunking	95	0.5
White Water Canoeing	57	0.3
Rock Climbing	21	0.1

1/Note: Multiple entries were permitted in this category resulting in total percents exceeding 100.

Source: U.S. Forest Service.

TABLE 19

ESTIMATED ATTENDANCE, 1979
WEST VIRGINIA STATE PARKS AND STATE FORESTS 1/

County	Attendance (000)		
	Resident	Non-Resident	Total
HIGHLAND SCENIC HIGHWAY COUNTIES			
Pocahontas 2/			
Cass Scenic Railroad	26.2	38.2	64.3
Droop Mountain	28.3	5.7	34.0
Watoga	70.8	43.1	113.9
Seneca State Forest	16.8	5.0	21.8
Randolph			
Kumbrabow State Forest	16.2	3.5	19.7
Subtotal - 2 counties	158.3	95.5	253.7
OTHER COUNTIES IN THE ZONE OF INFLUENCE			
Fayette			
Babcock	107.9	39.6	147.5
Hawks Nest	296.1	321.2	617.3
Grant	-	-	-
Greenbrier			
Greenbrier State Forest	75.1	22.4	97.4
Hardy			
Lost River	75.8	119.8	195.6
Monroe	-	-	-
Nicholas			
Carnifex Ferry	72.0	8.2	80.2
Raleigh			
Grandview	373.7	40.9	414.6
Summers			
Bluestone	227.6	25.3	252.9
Pipestem	668.0	339.1	1,007.1
Tucker			
Blackwater Falls	194.7	237.2	431.9
Canaan Valley	250.6	248.0	498.7
Fairfax Stone	3.2	3.5	6.7
Webster			
Holly River	58.6	7.8	66.5
Subtotal - 11 counties	2,403.3	1,413.0	3,816.4
Subtotal - 13 counties	2,561.6	1,508.5	4,070.1
OTHER WEST VIRGINIA	2,150.2	837.5	2,987.7
Total - West Virginia	4,711.8	2,346.0	7,057.8

1/ All listings are State Parks except those specifically designated as State Forests.

2/ Unfortunately, visitation data are not available for Calvin Price State Forest and Beartown State Park, also in Pocahontas County. However, since local sources judge visitation levels to be low, the omission does not seriously affect the analysis.

Source: West Virginia Department of Natural Resources, Division of Parks and Recreation.

In both the zone of influence and the two Highland Scenic Highway counties, attendance was about 61-62 percent resident and 38-39 percent non-resident. Visitation was highest in July and August when summer weather is at its best for hiking, camping, and other outdoor pursuits (Table 20). The May/June season was active where fishing, canoeing or other spring time recreation is possible; e.g., at Cass Railroad, Droop Mountain and Watoga in Pocahontas County, and Hawk's nest and Pipestem in other parts of the zone of influence. Fall foliage and/or hunting extend the season to October at Cass Railroad and past October at Droop Mountain, Canaan, and Hawk's Nest. At Canaan, skiing makes January and February the two most popular months and produces for that park a year-round recreation cycle.

(c) Snowshoe Ski Resort

The winter ski season at the privately-owned Snowshoe Resort complements the region's other outdoor recreation seasons. Because of high elevation, the resort enjoys about 130 ski days each year (Thanksgiving to late March-early April), an average generally comparable to New England and substantially above neighboring ski areas in the Appalachian range.

According to officials at Snowshoe, there were 205,000 skier days during the 1979-80 season, up from 130,000 the previous year. Nearly 50 percent of skiers come to the resort from the east (Virginia, Maryland, North Carolina, Tennessee, and the District of Columbia), about 20 percent from the north (principally Pittsburgh and parts of Ohio), and 25 percent from the west (including West Virginia itself, which supplies about 30 percent of Snowshoe skiers). About one-third of all skiers arrive by bus in group tours. Length of stay ranges from one day to two weeks, averaging about 3.5-4 days.

At the present time, the impressive plant of facilities at Snowshoe is seriously under-utilized outside of the ski season. Occupancy, which approaches 100 percent from Christmas through late March, drops precipitously in spring, summer, and fall. The few hunters, fishermen, and occasional sightseers fill only a small portion of available rooms. Summer programs have been difficult to promote because mountain temperatures are too cool for swimming, even in a heated pool. Also, fog is frequent. Further, financing is not yet available for a planned golf course. However, seven tennis courts are in place and management has embarked upon an ambitious promotional program aimed at attracting offseason meetings, seminars, conventions, and other group events.

New business produced by this program could have significant impact on the region, in terms of expenditures and employment. As benchmarks, expenditures by Snowshoe skiers average $33 per day overall: slightly over $20 per day for day skiers, and over $50 for those staying overnight. The Snowshoe resort and its concessionaires presently employ 526 during the ski season and 90 offseason. About 60-70 percent of seasonal employees are local; the remainder are brought in temporarily from other places.

TABLE 20

STATE PARK VISITATION, BY MONTH, 1979
SELECTED STATE PARKS IN ZONE OF INFLUENCE

	Pocahontas County State Park						Other State Parks in Zone of Influence					
	Cass Railroad		Droop Mountain		Watoga		Canaan		Hawks Nest		Pipestem	
Month	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	0	-	380	1.1	380	0.3	59,770	12.0	1,065	0.2	51,422	5.1
February	0	-	425	1.2	410	0.4	63,280	12.7	1,765	0.3	55,074	5.5
March	100	0.2	465	1.4	705	0.6	33,905	6.8	16,060	2.6	50,134	5.0
April	200	0.3	565	1.7	2,200	1.9	23,060	4.6	44,175	7.2	83,637	8.3
May	2,957	4.6	4,810	14.1	8,650	7.6	23,150	4.6	52,260	8.5	166,703	16.6
June	8,803	13.7	2,995	8.8	26,475	23.2	31,910	6.4	82,080	13.3	100,952	10.0
July	18,713	29.1	4,925	14.5	31,750	27.9	40,385	8.1	49,805	8.1	110,798	11.0
August	18,564	28.9	6,525	19.2	28,475	25.0	47,410	9.5	161,925	26.2	130,074	12.9
September	7,276	11.3	4,770	14.0	5,575	4.9	44,770	9.0	32,475	5.3	75,856	7.5
October	7,721	12.0	4,950	14.6	4,065	3.6	54,370	10.9	136,000	22.0	64,826	6.4
November	0	-	2,700	7.9	2,300	2.0	36.400	7.3	25,750	4.2	57,129	5.7
December	0	-	510	1.5	2,950	2.6	40,240	8.1	13,910	2.3	60,532	6.0
Total	64,334	100.0	34,020	100.0	113,935	100.0	498,650	100.0	617,270	100.0	1,007,137	100.0

Note: Totals may not add precisely, due to rounding.

Source: West Virginia Department of Natural Resources, Division of Parks and Recreation.

(d) National Radio Astronomy Observatory

According to officials at the National Radio Astronomy Observatory, the Green Bank facility has attracted an average of 20,000 visitors annually since 1975. It is estimated that about 50 percent of visitors come from West Virginia, and that West Virginia, Virginia, Ohio, Maryland, and Pennsylvania together account for 90 percent of total volume.

d. Travel Expenditures

The State of West Virginia, Travel Development Division, estimates that expenditures by travelers in West Virginia totaled $745 million in 1978, up from $715 million in 1977 (Table 21). Of this $245 million, or 33 percent, was spent in the 13-county zone of influence covered by this study--$33 million (4.5 percent) in the two Highland Scenic Highway counties and $212 million (28.5 percent) in the surrounding 11 counties.

e. Interpretative Summary

Tourism today in the two counties through which the proposed extension of the Highland Scenic Highway would pass, and in the larger 13-county zone of influence, is oriented primarily to the scenic quality of the mountains and the recreational opportunities they afford. Both public and private development is typically small-scale and low-density. The significant exceptions are (a) in the public sector, Monongahela National Forest, with its extensive land holdings, and Pipestem and Canaan State Parks, with their relatively intensely developed recreational system; and (b) in the private sector, the resort complexes at The Greenbrier and Snowshoe.

The rugged mountain range has a negative aspect as a physical and psychological barrier to access which impedes inter-regional travel, thereby limiting the total volume of tourism to the region, confining the span of the primary market area, and dictating the types of tourism and recreational markets that can be attracted.

Market volume for the 13-county zone of influence is estimated at approximately 3.5 million trips to or through the area by persons traveling at least 100 miles away from home. Of these, about 1.1 million person-trips are destination trips terminating in the zone of influence. For the two Highland Scenic Highway counties, comparable estimates are 585,000 person-trips for all travel to or through the counties and 180,000 person-trips to destinations there.*

Recreation volume, based on reports of the various attractions, is estimated for 1977 to number in the range of 5 million visits made by travelers who are either passing through or destined to the zone of influence. Within the two highland Scenic Highway counties, the size of the market is judged to be in the range of 500,000-700,000 visits annually.

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* For statistical basis and methodology used in developing these estimates, see Working Paper No. 3.

TABLE 21

TRAVEL EXPENDITURES IN WEST VIRGINIA, 1977-78

	$ Millions		Percent	
	1977	1978	1977	1978
Highland Scenic Highway Counties	34.8	33.3	4.9	4.5
Other Counties in the Zone	173.6	211.6	24.3	28.4
Subtotal - 13 counties	208.4	244.9	29.1	32.9
Other West Virginia	506.6	500.4	70.9	67.1
Total	715.0	745.3	100.0	100.0

Source: West Virginia, Governor's Office of Economic and Community Development, Travel Development Division.

TABLE 22

ESTIMATED NUMBERS OF TRAVELERS, 1978

	State of West Virginia	Pocahontas and Randolph Counties
Overnight Stays - Commercial Accommodations	3,237,500	222,499
Overnight Stays - With Friends and Relatives	7,480,241	341,677
Day Visits	14,503,429	650,875
Total	25,221,170	1,215,051

Source: Bureau of Business Research, West Virginia University.

A special tabulation of statewide figures run by the Bureau of Business Research at West Virginia University indicates that, when travel is defined to include all trips outside of the home community (except for commuting) with no restriction on distance, travel volume in the two Highland Scenic Highway counties totaled about 1.2 million visits in 1978 (Table 22). This figure would seem consistent with the above estimates, taking into account growth from 1977 to 1978 and variation of definition. Day visits accounted for slightly over half of total volume. There were additionally 340,000 overnight visits with friends and relatives and about 222,000 overnights in commercial accommodations.

Principal characteristics of current markets might be summarized as follows:

<u>Purpose of Visit</u>. Outdoor recreation is the principal purpose of visit for an estimated 50 percent of travelers to destinations in the zone of influence. Most popular outdoor recreation activities currently include sightseeing, camping, hiking, skiing, hunting, fishing, nature study, and picnicking. Lower volume special interest sports include spelunking, white water canoeing, and rock climbing.

<u>Seasonality</u>. Approximately one-third of travel to the region occurs in spring and 40 percent in summer. During July and August, most existing attractions and facilities enjoy high occupancy, particularly on weekends, except the Snowshoe Ski Resort where occupancy is very low outside of the ski season. May and June bring fishermen, canoeing or whitewater enthusiasts; the fall--particularly October--is popular for viewing foliage and for hunting; and the winter brings skiers.

<u>Point of Origin</u>. About 65 percent of all visits to the zone originate in West Virginia. The vast majority of out-of-state travel originates in neighboring states: Ohio, Kentucky, Virginia, Maryland, and Pennsylvania.

<u>Transportation</u>. Because there are few viable alternatives, virtually everyone travels to the zone of influence by automobile or truck; an estimated 15 percent of vehicles carry camping equipment.

<u>Duration of Trip</u>. Less than half of all trips to the region remain overnight. Among those who stay, trip length probably averages about 3-4 days overall.

The two principal problem areas identified are:

- Difficult inter and intra-regional travel. Excepting only Interstate-64 which cuts across the southern portion of the zone of influence, all access to the region and intra-regional travel must utilize secondary roads over mountain terrain. Travel is consequently difficult at best and often hazardous, particularly in winter.

- Uneven seasonality, both for the region as a whole and at individual elements in the resource base. Despite the fact that recreational opportunities are available year-round, both demand and degree of development vary substantially. Congestion occurs, but very selectively, in July and August, at the height of the fall foliage season, and at the height of the winter ski season. At other times of the year, the resource plant is under-utilized.

B. RESOURCES

1. Recreation

Based on the U.S. Forest Service publication entitled The Upper Shavers Fork Sub-Unit Plan and EIS, the Highland Scenic Highway Study area is located primarily in Sub-Unit #10. Part A of this sub-unit is north of Route 250 and mostly under National Forest Service ownership and has been the subject of detailed recreation management studies. Part B of this sub-unit is located south of Route 250 and encompasses most of the HSH study area. The majority of this area is under private ownership and has not been studied as thoroughly for recreation management. The U.S. Forest Service recommended recreation management direction in this area provides for opportunities for primitive, semi-primitive and roaded natural recreation. (See Figure 8A).

a. Recreation Associated with the Completed Segment of the HSH

Along the section of the Highland Scenic Highway which has been constructed, a series of scenic overlooks have been included with several others in the planning stages. These overlooks are strategically located to allow the visitor to better experience the natural and man-made amenities of the region (Figure 2). The following chart identifies these existing scenic overlooks and gives their distances from Route 219:

FACILITY	DISTANCE FROM U.S. RT. 129
Red Lick Overlook	2.5 mi.
Little Laurel Overlook	5.5 mi.
Little Spruce Overlook	14.0 mi.
Big Spruce Overlook	16.5 mi.
Cranberry Glades Overlook	18.0 mi.

b. Interpretive Facilities

Interpretive Facilities as defined by the U.S. Forest Service are intended to enrich the experience, and heighten the understanding of on-the-ground visitors as well as orient and explain local human and natural history, natural resources and their management. Throughout the Monongahela National Forest numerous facilities have been developed for user enjoyment. The following is a list of these facilities:

Existing Facilities

Cranberry Mountain Visitor Center
Seneca Rocks Visitor Center
Gaudineer Scenic Area Trail (just north of 250)
Cranberry Glades Walk
Plant Kingdom Trail
Beaver's Tail Braille Trail
Whispering Spruce Trail

Existing Facilities (cont'd)

Northland Loop Trail
Gatewood Resource Mangement Trail
Seneca Interpretive Trail
Allegheny Historical Cabin

c. Snowshoe Resort

The Snowshoe Development includes ±7,000 acres of privately owned land. The ski resort, which was purchased in 1972 and opened in 1974, has begun the construction of condominiums and lodges. The future development plans include the construction of a golf course, tennis courts, and enlarged skiiing facilities which will make the development a year-round resort. Cross country skiing is also popular in the area.

d. Cass Scenic Railroad

The Cass Scenic Railroad originates from a station located in the Town of Cass; from there it ascends Back Allegheny Mountain to the Bald Knob Scenic Observation and Picnic Area. The railroad, which operates from spring to fall, attracts thousands of riders each season and is a significant recreational amenity for the area.

e. Hiking and Camping

The demand for hiking and camping in the HSH study area is increasing. Some trails, such as the Shavers Mountain Trail are located in the vicinity of the study area, while many trails have been abandoned because of location or ownership. Many of the logging and mining roads are utilized by hikers. The most developed camping areas are located to the north near the Gaudineer Scenic Area and Interpretive Trail where the National Forest Recreation Survey (NFRS) studied 30 potential campsites, and selected three sites for future development.

f. Hunting and Fishing

The forest lands are a significant hunting and fishing area. The Shavers Fork has long been noted for its abundance of trout. Hunting for deer, turkeys, and bear is also very popular. Hunting and fishing on Mower lands requires a fee permit from the company.

2. Visual Resources

The Highland Scenic Highway study area is characterized by rugged topography, mature stands of northern hardwoods and spruce forests, and a vast number of small streams and runs. Throughout the area, numerous knobs fill the landscape and are topographic formations presenting visual interest. Utilizing the National Forest Service visual classification system, the area's visual elements were rated.

In the southernmost portion of the study area where peak elevations are approximately 4,000 to 4,200 feet, Gay Knob, Chestnut Flat, Moffet Knob, and Cloverlick Mountain are clustered. This grouping forms a visually interesting array of drainage patterns. Gibson Knob, Tallow Knob and Mace Knob are located north of this area, approaching the Cheat Mountain range. Also situated in this area is the saddle formation caused by the geologic syncline at Thorny Flat. This formation, at an elevation of 4,800 feet, is highest elevation within the study area. The Back Allegheny Mountain extends in a north-south direction and is characterized by its higher elevations and steep slopes. Farther north, the linear Beech Flat Knob, Ward Knob, and Snyder Knob, with elevations ranging from 4,500 to 4,700 feet, are found. Crouch Knob and Barton Knob are situated in the northernmost portion of the study area.

The characteristic vegetation associated with the landscape is primarily northern hardwood forests. Significant spruce stands are located primarily in the northern portion of the study area at higher elevations. These spruce stands are classified as important viewing amenities.

Due to the extreme differences in elevations and drainage patterns, numerous small streams and runs exist which create visual interest. The Shavers Fork begins at the saddle on Thorny Flat and meanders northward to the end of the study area at Cheat Bridge. Although it is a small river, it represents a focal point of interest.

The Snowshoe Resort also occupies a large portion of the landscape. It is classified as a significant use-area with high visibility from most of the watershed.

In addition to Snowshoe, throughout the area man's influence can be seen. The influences of logging, specifically skid lines, work roads, and clearcut areas, are prevalent. Scars from stripmining activities are present mostly in the northern portion of this study area.

3. Historical, Cultural, and Archeological Resources

Phase I archeological reconnaissance work aimed at identifying potentially significant sites and developing a general feel for previous human use and activity in the project area has been completed by staff of the James Madison University Archeological Research Center. The work involved research, analysis, and field reconnaissance, over at least 25 percent of the length of each alternative and segment (A-H) under study, and within 100 feet of the alternatives' center lines. The complete archeological survey results are contained in a technical report supporting this document.[5]

a. History

For discussion purposes, the history of the area can be divided into four eras; prehistoric (prior to European influence), European influence and settlement, Civil War, and the lumbering era. Although people have occupied the eastern United States for over 10,000 years, because of its rugged topography permanent settlements have not been established in the project area until, relatively speaking, the recent past.

The prehistoric evidence suggests that Indians, the aboriginal culture, established only temporary hunting camps in the project area. The first permanent settlement, Cheat Bridge, in the project area was established during the European influence and settlement period. It was established in the early 19th century after Indians, the Shawnee, surrendered all claim to the area in the mid 1790's and after the Staunton-Parkersburg Turnpike (now U.S. Route 250) was established.

During the Civil War, the area experienced some activity, including battles over control of the turnpike and establishment of a Union fort, Fort Milroy, at the summit of Cheat Mountain on the turnpike. Most of the area remained unsettled, however, until the 1880's. After the Civil War, the country entered the era of rapid economic growth which brought on a demand for more timber. This industry flourished in the project area in the late 19th and early 20th centuries, especially after the construction of railroads in the area. Numerous settlements developed to support this industry and the lumbering era of the early 20th century marked the high point of human activity in the vicinity. This level of activity declined after poor timber management practices and forest fires severly limited the timber availability.

Coal mining, another important activity in the area's history, began in the Shavers Fork area in 1903 as an activity to supply coal for lumbering operations. It was not until shortly after World War I that a commercial deep mine was opened near Cheat Bridge. In the 1940's, stripmining began on White Top near the Fort Milroy site. By the late 1960's, the future of coal mining had generally diminished until the recent energy situation created an increased demand for this fuel.

TABLE 23

HISTORIC SITES IDENTIFIED: PHASE I ARCHEOLOGICAL RECONNAISSANCE

Site No.	Highway Seg.	Era	Description	Items Found	State of Pres.	Rec.
1	A	Prehistoric	May have been temporary Indian hunting camp	19 artifacts	Partially preserved	Phase II level of investigation needed
2	B	Prehistoric		4 artifacts	Disrupted by House Construction	No further work
3	D	Prehistoric		2 artifacts	Unknown	Advanced Phase I level of investigation
4	D	Prehistoric		1 artifact	Badly disturbed - flood plain	No further Work
5	D	Prehistoric		5 artifacts	Good	Advanced Phase I level of investigation
6	D	Prehistoric		1 artifact	Appears to be Preserved	Additional Examinations necessary
7	A	Prehistoric	Appears to have been seasonal hunt or camp site	65 artifacts	Recently disturbed by logging & erosion	Additional Examinations necessary
8	C	Prehistoric		2 artifacts		Additional Examinations necessary
9	H	Prehistoric		8 artifacts	Appears to be partially destroyed	Additional Examinations necessary
10	H	Prehistoric		1 artifact	Appears to be destroyed	
11	H	Historic/ Prehistoric		Prehsitoric artifacts & scattered remains of historic structures	Disrupted	Additional work needed
12*	F	Historic	Adandoned town of Spruce	Foundation stones		Additional work needed
13*	H	Historic	5 railroad "camp on wheels" cars	Remains of RR cars	Poorly Preserved	Additional work needed
Isolated Find	C			1 projectile point		

*Site beyond 100 feet of centerline, but within visual proximity

b. Sites Identified

The Phase I archeological reconnaissance work identified 13 relevant sites and one isolated find. Ten prehistoric sites (1-10), two historic sites (12-13), and one historic/prehistoric site (11) was disovered and are summarized on Table 23. Additionally, beyond the 100 feet from center line area, other logging and/or mining related sites were found.

Only three of the prehistoric sites appear to be in a preserved condition (sites 1, 5, and 6); the other seven appear to have been disrupted by logging, mining, and flooding. Four of these prehistoric sites could be identified as once being temporary Indian hunting camps. None of the prehistoric sites could be reliably placed with respect to time or cultural association.

The two historic sites from the lumbering era include the remains, foundation stones of the Town of Spruce (Site 12), and some railroad "camp on wheels" cars (Site 13). Historic/prehistoric Site 11 contained some prehistoric artifacts and scattered remains of some historic structures. The isolated find consisted of one projectile point.

In addition to the sites in the immediate project area, there are nine sites on the National Register of Historic Places within about a ten mile radius of the project area. These places and their distances from the project area are indicated on Table 24.

TABLE 24

SITES ON THE NATIONAL REGISTER OF HISTORIC PLACES

Pocahontas County	Location	Distance* from Project Area
Droop Mountain Battlefield	Rt. 219, South of Hillsboro	35 miles
Pearl S. Buck House	Rt. 219, Hillsboro	30 miles
Reber Radio Telescope, National Radio Astronomy Observatory	Green Bank	9 miles
Cass Scenic Railroad	Cass	In project area
Frank and Anna Hunter House	Rt. 219, Marlinton	20 miles
Pocahontas Times Print Shop	801 Second Ave., Marlinton	20 miles
Huntersville Presbyterian Church	Co. Rt. 21 at Rt. 39, Huntersville	23 miles
Chesapeake and Ohio Railroad Station	Eight St. and Fourth Ave., Marlinton	20 miles
Randolph County		
E. E. Hutton House	Rts. 219 and 250 and Union St., Huttonsville	20 miles

*Straight line distance from the center of the project area.

4. Soils

A number of different U.S. Department of Agriculture soil series are present in the study area. These soils are residual, colluvial and alluvial in origin, with residual soils being the most common. Additional information regarding the soils of the study area can be found in the "Soils and Geology Technical Report".[6] Descriptions of the area's soils are in Appendix D.

5. Geology

a. Geologic History

Beginning in the Cambrian Period at the start of the Paleozoic Era, approximately 800 million years ago, the ancient land mass of the study area began to subside beneath the sea. This initiated an era of sediment accumulation lasting through the Permian Period about 230 million years ago. The Allegheny orogeny that occurred at the end of the Permian Period uplifted and folded the sediments into mountains. Since that time, the study area has been an erosional land mass with only small amounts of deposition occurring in lakes and around streams.

A more detailed discussion of the area's geologic history as well as other geologic parameters can be found in the "Soils and Geology Technical Report".[6]

b. Geomorphology

Virtually all of the study area is located in two sections of the Appalachian Plateau physiographic province, the Allegheny Mountain section and the Unglaciated Plateau section. The remainder of the area is situated in the Newer Appalachian section of the Valley and Ridge province.

The Allegheny Mountain section to the northwest, is characterized by slightly folded bedrock. The mountains are plateau-like and the valleys are dissected plateau rather than valley lowlands. Valleys are generally V-shaped and the side slopes frequently are broken into a series of benches because of differential weathering of the bedrock.

The southwestern portion of the study is in the Unglaciated Allegheny Plateau. Bedrock in this area is relatively flat-lying with karst topography developing in some limestone areas.

The Greenbrier River Valley in the eastern portion of the study area is located in the Newer Appalachian Physiographic Province, which is characterized by folded bedrock which results in series of parallel ridges and valleys.

c. Stratigraphy

All of the rocks exposed within the study area are sedimentary in origin and range in age from Late Devonian to Early Pennsylvanian. Several unconformities are present in the stratigraphic column, the most significant of which are the disconformities at the contact of the Pottsville and Mauch Chunk. Descriptions of stratigraphic units are presented in Appendix E.

Geologic mapping of the study area is shown on Figure 9.

d. Structure

The most prominent sturctural feature of the area is the North Potomac Syncline. This fold underlies the Shavers Fork Valley as well as some of the adjacent mountains. The syncline plunges north-northeast and is nearly symmetrical, the eastern limb of the fold dipping slightly more than the western limb. The other major folds located in the study region are the Deer Park Anticline, the Blackwater Anticline and the Brown Mountain Anticline. Regional strike of bedding is approximately N30°E and dip is generally 4 to 8 degrees. No major faults have been mapped in the study area.

f. Geological and Soil Related Hazards

The geologic and soils investigations undertaken in conjunction with these studies revealed that there were major areas of concern related to the physical properties of the soils and geology of the study area. These areas of concern include: landslide hazards, soil erosion, and surface and groundwater contamination. These concerns are addressed in Section V.E.3. Soil and Geology Related Impacts.

6. Mineral Resources

a. Coal Resources

The presence of coal in the study area is limited to five seams of economic importance, all within the Pottsville Group, in the Shavers Fork Watershed (Figure 10). These seams, in descending order are: the Eagle, Gilbert, Hughes Ferry, Sewell, and Welch. At the present time, most mining activities are directed to the Sewell, Hughes Ferry and Gilbert. However, future demands for coal may lead to the exploitation of the remaining two seams.

The Eagle Coal is present primarily near the tops of hills in the northern section of the study area. South of Beaver Creek, the Eagle Coal has been eroded and is not present. Analyses indicate this to be a medium high volatile coal, low in sulfur and ash, with few bony partings. Average thickness in the study area is reported to be 34 inches.

Gilbert Coal lies approximately 75 feet beneath the Eagle and is persistent throughout the study area. Thickness varies from 1-6 feet and the average for reserve estimates is 34 inches. Like the Eagle, the Gilbert is a medium high volatile coal, low in sulfur and ash. This coal is presently being mined extensively west of Cheat Bridge.

Approximately 125 feet beneath the Gilbert seam lies the Hughes Ferry. The Hughes Ferry is very persistent and generally outcrops in the lower half of topographic highs. Analysis shows this coal to be medium in volatile matter and fairly low in sulfur and ash. The low sulfur content contributes to good quality coking properties. Hughes Ferry is the uppermost mineable seam in the New River Formation.

The Sewell Coal, which outcrops near the bottom of hills, has historically been the most exploited seam in the Shavers Fork watershed. Its low sulfur and ash, and medium low volatility make it a very good metallurgical and steam coal. Thickness varies from 2 to 7 feet and averages 48 inches.

Coal reserve estimates for the five coal seams in the study area are shown in Table 25.

TABLE 25

COAL RESERVE ESTIMATES

Seam	Range	Estimated Average	Estimated Recoverable Reserves (millions of tons)
Eagle	1-4	2.7	5
Gilbert	1-5	2.8	10
Hughes Ferry	1-3	2.5	21
Sewell	2-5	4.0	60
Welch*	---	---	—
TOTAL			96

* more detailed information required.

Reserve estimates for the 5 seams were completed using data compiled from the Pocahontas County Report, 1931, by David B. Reger, the Randolph County Report, 1929, by Paul H. Price, and through information provided by authoritative sources in the area. The extent of the seams was measured from mapping done at a scale of 1 inch equals 1 mile, and may therefore be of questionable accuracy. However, the estimates, as calculated, have been discussed with persons experienced in the Shavers Fork watershed and are believed to represent the best approximations possible at this time. As more updated information is obtained, revisions to these estimates can be made.

It is indicated that the Mower Lumber Company retains subsurface mineral rights beneath its lands and those of the Snowshoe Company. The other tract owners in areas where potentially recoverable coal is located have acquired the mineral rights as well as surface ownership.

b. Mineral Resources Other Than Coal

Except for limestone, which is lightly quarried in the study area, mineral resources other than coal are generally not available in sufficient quantity to be economically extracted.

(1) Oil and Gas

Oil and gas production is not at present of significance in the study area. Although oil and gas reserves tend to be located toward the western part of West Virginia, the same geologic formations extend eastward, and extensive exploration and drilling for natural gas is being undertaken in eastern West Virginia including areas near the study area.

Much of the rock structure in the study area is ill-suited for a petroleum reservoir. The North Potomac Sycline, the most prominent structural feature does not act as a trap because of the attitude of its beds. The Blackwater Anticline has the proper configuration; gas could be trapped near the crest of the fold. Some gas production is likely from the Devonian Oriskany sandstone since oil and gas have been found in other areas of Randolph and Pocahontas Counties. Recent exploration has also shown that the lower Chemung may have gas producing potential.

Some interest in the development of unconventional gas in the Devonian shales and in the recovery of methane from coal beds has lately been expressed by the Eastern Gas Shales Project. Presently there is insufficient data to determine whether either form of gas can be exploited commercially.

(2) Limestone

The Limestone is suitable for the manufacture of Portland cement, agricultural and building lime, concrete aggregate, road metal, railroad ballast, blast furnace flux, and other industrial products. At some locations, the Greenbrier is suitable for use as dimension stone. At present, the limestones in the study are not quarried or mined commercially.[9]

The Union limestone in the Greenbrier Group is perhaps the most important unit. Its upper Gasper portion is quite pure and suitable for the manufacture of lime. The lower Fredonia portion is silicous, which makes it more durable and well suited for road metal, aggregate, and ballast. The Hillsdale and the Sinks Grove limestones are also silicious, and suitable for crushed aggregate.

(3) Iron

Iron occurs as sedimentary deposits of limonite and hematite in the red shales of the Mauch Chunk and Catskill formations, but commercial recovery is not economically feasible. Similar deposits may also occur in the Oriskany and Clinton formations which underlie the study area but do not outcrop.

(4) Manganese

Manganese occurs in association with the iron minerals, particularly in the Oriskany formation, but not in commercial quantities.

(5) Precious Metals

Small amounts of gold, silver, copper, lead, and nickel are said to have been found in both Pocahontas and Randolph Counties. The occurrence of these metals is of historic and scientific interest rather than economic importance.

(6) Clay

Shale form both the Mauch Chunk and Maccrady Groups appears suitable for making brick and tile and for use in manufacturing Portland cement. True "fireclays" are not abundant in the study area, although some may be associated with the coal measures in the Pottsville. No clay is taken at present from the region on a commercial basis.[9]

(7) Sand

There are no commercial sand operations in the study area at this time. Sand could be produced by crushing sandstone, but most sandstones are too hard to crush easily and are located near mountain tops in relatively inaccessible areas.

7. Timber Resources

The timber resources of the entire Shavers Fork Watershed, and of a corridor 2000 feet wide along proposed highway alignments outside of the Shavers Fork, are typed and delineated on Figure 11A through 11F. Because of a substantial difference in vegetative associations, the Shavers Fork watershed is discussed separately from the rest of the study area. Information on timber resources is summarized in Table 26. More detailed information on the quantity by species and diameter class and value for each is available in the Forest Supervisor's Office, Elkins, West Virginia.

TABLE 26

TIMBER VOLUME AND VALUE (AVERAGE PER ACRE)

Timber Type	Basal Area	No. Trees	Volume (Broad-Feet)	Value
Shavers Fork Watershed				
Spruce	68	75	10,925	$ 746
Spruce-Northern Hardwood	48	46	7,569	533
Northern Hardwood-Spruce	37	35	4,646	356
Northern Hardwood	33	32	3,444	318
Outside Shavers Fork				
Northern Hardwood	44	38	4,614	415
Northern Hardwood (OC)	32	30	3,333	297
Northern Hardwood (RC)	12	10	1,185	114
Northern Hardwood (P)	8	8	703	58
Mixed Hardwood	56	43	6,253	569
Mixed Hardwood (OC)	45	39	4,408	391
Mixed Hardwood (RC)	23	21	2,049	176
Mixed Hardwood (P)	26	28	2,223	209
Scrub Hardwood	4	4	289	00
Beech-Birch-Maple	42	37	4,290	324
Old Field-Forested	12	9	1,127	92

a. Shavers Fork Watershed

(1) General Description of Timber and Non-Timber Types of Vegetation

The species associations in the Shavers Fork drainage are almost exclusively beech, yellow birch, red and supar maple, black cherry and eastern red spruce. Black birch, hemlock, cucumber have been observed and included in the sample plots in very limited numbers and volumes. Timber

harvesting practices which began in the late 1800's have varied from high grading, and various degrees of selective cutting to clearcuts. These have resulted in stand size classes ranging from early reproduction, seedlings, saplings, poles, small sawtimber, and second growth sawtimber. No virgin or large growth timber was observed on any portion of the area visited.

(2) Commercial Operations

The size of the timber ownership in the Shavers Fork has allowed a timber harvesting program to be developed which produces substantial quantities of timber annually. This continuous and dependable flow of raw material has allowed the owners to develop markets and set prices and cutting policies which are not normally possible in the area on smaller ownerships. The agressive management and sustained output of eastern red spruce from its area has caused industries to be developed which are almost completely dependent on the area as a raw material base, specifically the rustic fence mills. Sawtimber output of red spruce has resulted in innovative marketing by local sawmills of red spruce construction dimension and rustic siding. This particular resource base and its development on a commercial scale has resulted in road construction and accessibility to an otherwise inaccessible area. The convenient location of wood based industries has allowed better utilization of timber and wood products cleared for strip mining activities.

(3) Indications of Occurrence of Unique Timber Resources

The occurrence of eastern red spruce in commercial quantities represents the largest privately held volume within several hundred miles. Substantial quantities are owned by the U.S. Government but these are not as aggressively marketed for small products such as fence rails. Five mills in the area are wholly or partially dependent on this raw material base for their production. The sawtimber outputs for specialized products such as rustic siding or softwood construction dimension affect five or six mills to a lesser degree.

(4) Timber Types and Volumes

There are a limited number of species in the Shavers Fork watershed and type classes are chiefly variations of northern hardwood species, black cherry and eastern red spruce. Dogwood, striped maple, alder, rhododendron, laurel, blackberry and greenbrier are more commonly observed brush and herbaceous species.

There are four (4) basic timber species associations on the Shavers Fork Drainage area sampled. These have been designated on Figure 11 as spruce (SP), spruce-northern hardwood (SP-NH), northern hardwood-spruce (NH-SP), and northern hardwood (NH). The dominant species by volume is the indicated type in sawtimber stands and number of stems in submerchantable stands of poles, saplings, and seedlings. Subtype designations for all species types on Figure 11 are:

(S) Seedling-sapling stage occurs usually as a result of clearcut techniques commonly used during skidder logging. This was a practice used from the late 1800's until 1958 when it was abandoned in favor or more conventional eastern logging practices using tractors, rubber tired skidders and trucks. These stands range in age from five (5) to twenty (20) years.

(P) Poletimber stage ranges from 3" DBH to 10" DBH and has the same origin as the seedling-sapling stage. The cutting probably took place twenty to thirty years ago. Most of these stands are well stocked and will result in excellent stands in the future.

(C) Cut designation indicates partial cuts made within the past ten years in sawtimber size stands. These are generally selection cuts and in a small number of cases shelterwood cuts.

(CC) Clearcut made within the last five years has been indicated in this fasion. These are in the seedling stage almost exclusively.

Sampling has been limited in seedling-sapling and pole-timber stands due to the non-commercial condition of these stands.

Spruce - SP

This type is dominated by eastern red spruce and where it is indicated it can be assumed that it is 90% spruce by volume or in the case of submerchantable stands, 90% of the number of stems. The type is generally at the higher elevations and on poorly drained soils. It is found however, throughout the area and represents the maximum growth potential per acre. Current timber management cutting policies seem to favor the reproduction of spruce to maximize the economic returns. The cutting practices have effectively reproduced the species and will eventually make up the largest area in the watershed. Beech and birch are the primary hardwood species associated with spruce in this type. Much higher volumes per acre of growth will occur in spruce stands. This can be attributed to the higher number of stems (density) per acre and higher average merchantable lengths. The species is subject to windthrow due to shallow root systems and generally are not thinned when occuring in pure or nearly pure stands. This accounts for the numerous clear-cuts commonly seen in this type.

The average volume per acre of this type was 10,925 board feet based on International 1/4 Rule, and had an average value for sawtimber of $745.72 per acre (Table 26).

Spruce-Northern Hardwood - SP-NH

Eastern red spruce dominates this type but to a lesser extent. Stands designated as such will be composed of 50% to 90% spruce and the balance as northern hardwood. The most common hardwoods seen in these stands are beech, yellow birch, red maple and sugar maple; to a lesser extent, cherry, magnolia and black birch. Past cutting practices have favored spruce. Advance reproduction from partial selective and shelterwood cuts have resulted in an abundance of spruce reproduction. In some cases a dense mat of seedings which now exists will probably require a pre-commercial thinning in order to avoid stagnation and maximize the growth.

The average volume per acre of this type was 7,569 board feet based on International 1/4 Rule, and had an average value for sawtimber of $533.12 per acre (Table 26).

Northern Hardwood-Spruce - NH-SP

The hardwood species mentioned in the spruce-northern hardwood association predominates in this type and makes up 50% to 90% of the stand. The volumes per acre are generally lower in these stands and growth will be somewhat less due to the limited amounts of spruce. These hardwood species are characteristically slow growing with the exception of cherry. The growing season is also somewhat shorter at this elevation further limiting the growth in this type. Black cherry occurs frequently as a dominate both in height and volume and nearly pure stands of cherry occured in several locations but not to a degree which could be sampled and designated on the maps as a distinct type with great enough frequency that sampling reliability could be achieved.

Selection cuts were frequent in this type favoring maple, cherry and spruce. Shelterwood harvests have been used also in this type resulting in advance reproduction of the species in this association.

The average volume per acre of this type was 4,645 board feet based on International 1/4 Rule, and had an average value for sawtimber of $356.94 per acre (Table 26).

Northern Hardwood - NH

Red maple, sugar maple, black cherry, beech, yellow birch, black birch, elm, magnolia, basswood and cucumber make up the species most frequently found in this type. The last five occured infrequently, making up less than 5% of the total stand. Some clear cuts have occured in these stands where rail and steam skidder logging occured but has been less frequent in recent years. For the most part, partial cuts of a selection nature have predominated. These have been individual tree selection and not diameter limit cuts.

The average volume per acre of this type was 3,444 board feet based on International 1/4 Rule, and had an average value for sawtimber of $317.74 per acre (Table 26).

b. Outside of the Shavers Fork Watershed

(1) General Description of Timber and Non-Timber Types of Vegetation

The species associations outside the Shavers Fork drainage generally begin to change as elevations drop off and the aspect begins to have a greater influence upon the species composition and size of timber. The Northern Hardwood type continues to be in existence but to a lesser extent, at lower elevations. On warmer sites oak and hickory, cucumber, basswood, elm, yellow poplar, white ash, red maple are the primary species which make up a mixed hardwood type. The timber harvesting activities within the Corridor areas has not been as consistent as in the Shavers Fork due to the fractured ownership by small land owners who have not followed as consistent practices in the harvesting of timber on their properties. The cutting which has taken place here has been of a commercial nature indicating less planning

and consideration for the future of stands of timber. There are numerous old fields, open fields and old fields which have been re-forested as a result of natural regneration. These generally have little or no commercial timber value, however, they would be classified as a woodland situation as they are predominantly in use as woodland, and no longer in use for farming or pasturing purposes. There is a considerable range in sizes of timber, including early reproduction, seedlings, saplings, poles, small sawtimber, and second growth sawtimber. In some few cases there is large, over mature, cull timber which has been left as a result of previous logging operations in difficult locations. No virgin or large growth timber was observed to any extent on the areas surveyed.

There is wide variety of timber productivity situations on these corridors as might be expected. The productivity was not as consistent as we saw in the Shavers Fork, largely due to the changes in aspect.

(2) Commercial Operations

This land is not as significant as a commercial timber production base in the area as the one or two single large ownerships in the Shavers Fork. The single largest ownership is the Snowshoe ownership. Several small ownerships of desirable, well stocked timber stands also exist. Other commercial sales within the area are obvious and it is assumed that commercial sales of a similar nature could be made on any or all of the smaller ownerships. The existence of wood based industries is apparent from cutting activities. Four large mills are within easy hauling distance of the area.

(3) Indications of Occurrence of Unique Timber Resources

No unusual timber species were observed in the survey. The old field types, including old fields which had been re-timbered as a result of natural reproduction, are more apparent in areas previously used for agricultural purposes and now abandonded. The inaccessibility of the area, and the cold, high elevations, make these remnants of the past an interesting observation.

(4) Timber Types and Volumes

There are a greater number of species within these corridors than previously observed in the Shavers Fork drainage. The primary species observed were red and sugar maple, black and yellow birch, yellow poplar, basswood, cucumber, black cherry, red spruce, elm, locust, red and white oak, and white ash. The white oak occured in very limited quantities. The non-com-ercial species which were observed were dogwood, striped maple, alder and laurel, with black berry and greenbrier being observed in the cutover areas.

There are three additional basic timber species associations on the corridor areas sampled. These have been designated as Mixed Hardwood (MH), Beech-Birch-Maple (BBM) and Old Field (OF). The additional subtypes are related to previous cutting history and are designated as follows:

(OC) Older Cut areas have been logged 15-25 years ago and still contain merchantable quantities of timber.

(RC) Recent Cut areas have been harvested in the past 3-5 years by a diameter limit harvest removing the major part of the commercial volume.

(F) Forested old fields is land previously cleared and designated as agricultural land but abandoned many years ago and reverted to a woodland condition. Some of these are rather advanced in age, containing poletimber and small sawtimber. In most cases, however, the predominant size class is saplings and seedlings.

Volume and value information for areas outside the Shavers Fork Watershed is summarized in Table 26.

8. Terrestrial Wildlife

Detailed descriptions of the wildlife and habitat of the project area are contained in the Technical Report "Terrestrial Wildlife Evaluation" prepared as part of this study.[10] The technical report has been summarized for inclusion in this environmental impact statement.

a. General Description

The study area from U.S. Route 219 to U.S. Route 250 is relatively undeveloped, with access limited primarily to logging roads or one-lane gravel roads. The area was extensively lumbered in the early 1900's and again in the 1930's. The Shavers Fork watershed is at present being managed for timber and coal production. Wildlife habitat is good, and the area supports significant populations of game and non-game terrestrial, aquatic, and avian wildlife.

The project area can be divided into two distinct areas of natural vegetative communities (Figure 11A-11F). The Shavers Fork watershed once supported a mature red spruce forest. This watershed has been extensively timbered, however, and northern hardwoods and black cherry have become important understory and secondary growth elements. The area surrounding the Shavers Fork watershed supports an oak-hickory type of woodland. Interspersed in both vegetative areas are limited amounts of grassland and open vegetative units, including grazing areas, spaces opened for timber and coal roads, clear cuts from timbering, strip mined areas, and a limited amount of bottom lands along streams. Tbe Snowshoe Resort retains open space grassland areas for ski slopes and other activities.

The red spruce type of vegetative association is often relatively sterile as wildlife habitat because of the lack of mast-producing trees and habitat diversity. Because the native red spruce forest of the Shavers Fork watershed has been repeatedly disturbed over the years by timbering and, more recently, by mining activities, the present association of spruce-hardwoods-black cherry represents a much higher quality habitat, offering food, cover, and diversity for wildlife. Today, over 35 percent of the watershed supports

vegetation less than 20 years old, and mature spruce covers only 10 percent of the land area. The watershed is continually changing as wildlife habitat and increased proportions of open and sapling areas can be expected over the next decade.

The project area outside of the Shavers Fork watershed, in oak-hickory vegetation, has a much greater proportion of open land presently in grazing, farming or residential use. Because of the abundance of mast-producing trees for food supply, the oak-hickory type of woodland offers prime habitat for an abundance of wildlife species.

Other important habitat components of the study area include wetlands, bogs, swamps, and caves. Wetlands occur mostly as a result of beaver activity. Significant beaver ponding areas are located near the headwaters of Rocky Run and Beaver Creek on Cheat Mountain and First Fork and Second Fork on Back Allegheny Mountain. Another relatively large beaver pond is found near the mouth of Black Run, south of Spruce. Areas of mature spruce forest located on northfacing slopes along Cheat Mountain could also be classified as forested wetlands, where the forest floor consists of large moss-covered rocks and tree roots, with water flowing or standing at or near the ground surface.

Numerous caves occur within the Greenbrier limestone on the eastern slope of Back Allegheny Mountain, along Cloverlick Creek, and in the Big Spring Fork drainage. Most notable is Cass Cave, located at the headwaters of Cold Run, west of the Town of Cass.

Important game species in the area include black bear, white-tailed deer, wild turkey, ruffed grouse, snowshoe hare, red fox, grey fox, gray squirrel and bobcat. Study area streams offer habitat for fur bearers, such as muskrat, beaver, fisher, skunk, mink, weasel, raccoon, and opposum. Such upland game birds as woodcock and snipe and game water fowl, both wood ducks and mallards, may also find suitable habitat in the area during migration periods.

The study area provides good habitat for a diversified community of avian life, an abundance of small mammals, such as bats, deer mice, voles, red squirrels, chipmunks and shrews, and a multitude of amphibians and reptiles, most notably the Cheat Mountain salamander.

b. Characteristics of Key Species

The wildlife study has resulted in the identification of species inhabiting the study area which are particularly susceptible to potential impact. This list includes endangered, threatened or rare species, plus the black bear, the wild turkey and the snowshoe hare. The black bear is included because of: (1) public concern; (2) the location of the project through one of the remaining prime black bear habitats in West Virginia; and (3) the special characteristics of vegetative habitat in the study area. The wild turkey is included because of: (1) public concern; and (2) a high sensitivity to human disturbance. The snowshoe hare is included because of: (1) public concern; (2) the study area approaches the southern limit of the species' continental range; and (3) the population in the study area is geographically separated from other populations.

(1) Black Bear

Remoteness and isolation from human activity are essential for good black bear habitat. The black bear population in West Virginia has steadily declined due to loss of remote areas as suitable habitat. Approximately 1,200 square miles of quality black bear habitat, in five areas, remain in the State.[11] One of these areas is located in the project area along Cheat Mountain south of U.S. 250 and continues north of U.S. 250. These areas are shown on Figure 12. Black bear population density in the study area is highest in the Shavers Fork Watershed. The West Virginia Department of Natural Resources has conducted radio-collar studies on the study area bear population and estimate a density average of four bears, consisting of two adults plus two cubs as a unit, per twenty square miles of habitat.[12] Although this is considered a high density in West Virginia, it should be noted that bear density in good habitat has been estimated to reach 8-10 bears per square mile.[13] Home range is estimated to be approximately 80 square miles for male and 50 for female.[14]

Major contributing factors to the relative high density in this area of West Virginia are the remoteness of the high country and the food production on the slopes of the Tygart Valley and Greenbrier Valley. The dense rhododendron thickets of the spruce-northern hardwood vegetation of the Shavers Fork watershed provide excellent breeding and cover habitat but, in some years, may be deficient in food supply. The eastern slopes of Back Allegheny Mountain and western slopes of Cheat Mountain provide an adjacent area of more mast-producing vegetation, due mostly to the presence of oaks.

There has been considerable concern for the bear population in West Virginia in recent years. Because of this concern, measures have been taken to shift the bulk of the hunting pressure from November to December in an attempt to reduce the number of females in the harvest. In effect, this shift will help sustain the reproductive segment of the population at an adequate level. The 1979 bear season began on December 10, and extended to December 29.* The kill of females dropped from a previous average of 27 per year to only 18 in 1979 - a savings of 33 percent.

The project area represents the center of bear hunting activity in the State. Randolph County ranked highest of the ten counties reporting bear harvest in 1979, and has been either first or second for the past 10 years. The 1979 seasonal harvest in Randolph County (34) comprises fifty percent of the total State seasonal harvest.

(2) Wild Turkey

The wild turkey population in West Virginia has been increasing over past years primarily because of habitat improvement and successful transplanting programs. The primary wild turkey range in West Virginia is shown on Figure 13. In the project area the best turkey habitat is within the oak-hickory vegetation in the lands south of the Shavers Fork watershed. Due to topography, the wild turkeys of the study area are estimated to have a relatively large annual home range and a density of 5-10 per square mile.[12]

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*All information on hunting is summarized from the "1979 West Virginia Big Game Bulletin" [15]

Remoteness from human activity as a requirement for the wild turkey varies per geographical area and per attitude and behavior of the human population.[10] The degree of activity/development and the availability and characteristics of surrounding habitat is also probably a factor in whether a particular population will tolerate and adapt to disturbance. In West Virginia, the wild turkey is apparently quite intolerant of disturbance and higher density populations are concentrated in relatively remote geographical areas.[11] [12] Areas of human development generally support very low densities of wild turkey.

Pocahontas ranked second and Randolph ranked seventh for all counties in the State for the 1979 spring gobbler harvest. The fall either-sex harvest in Pocahontas County was 254, the third highest county in the state. Randolph County ranked fifth with 194. The 1979 figures represent a significant reduction over 1978 figures: 28 percent in Pocahontas County and 21 percent in Randolph County. This is the second year in a row for harvest reductions and the 1979 harvest is the lowest in the past five years for both counties. It is important to note, however, that Pocahontas has been one of the top three counties in the State for the past five years.

(3) Snowshoe Hare

The habitat of the snowshoe, or varying, hare is limited to the high mountain elevations of the Allegheny Plateau. The snowshoe hare range in West Virginia is shown on Figure 14. The range coincides closely with the occurrence of red spruce and in the project area includes mostly the Shavers Fork watershed. Heavy populations usually occur at high elevations where snow is common in young stands of spruce with low growing hardwoods. Rhododendron thickets growing under a northern hardwood forest canopy are also good habitat. The snowshoe hare requires forest openings and edge habitat where sun light can penetrate to promote growth of a woody understory low enough for a rabbit to reach. Low evergreen cover is essential. The hare's home range is approximately 10 acres.

c. Endangered, Threatened or Rare Species

There are two species, whose range may include the project area, which are officially listed as endangered under the Endangered Species Act of 1973: the Indiana bat and the Virginia big-eared bat. The designated Critical Habitat of these species does not, however, fall within the project area.

A survey of the populations of the Indiana bat and Virginia big-eared bat in the Monongehela National Forest was initiated in 1973.[16] The only known populations of the Indiana bat within West Virginia at this time are contained in five caves: Big Springs Cave and Cave Hollow Cave in Tucker County; Hellhole Cave in Pendleton County; and Cass Cave and Marthas Cave in Pocahontas County. Cass Cave is located at the base of Back Allegheny Mountain, west of the town of Cass. Four Indiana bats were found when the cave was searched in December, 1974, and three individuals were found during a search in January, 1976.[17] It is suspected that a larger colony does

exist in Cass Cave, perhaps in a large room beyond a waterfall drop. The cave is very difficult to explore and if a larger colony does exist beyond the waterfall, the bats are probably inaccessible to human disturbance. There are no known Virginia big-eared bat colony caves in the project area.

Althouth not known to exist in the project area, suitable habitat may be present for the mountain lion, Eastern timber wolf, and American peregrine falcon.

Relatively rare or status unknown species in the project area include the fisher and the Cheat Mountain salamander.

The fisher disappeared in West Virginia in the early 1900's. The last known occurrence of fishers in the state was in the red spruce forests at higher elevations, including the study area. Twenty-three fishers from New Hampshire were reintroduced in 1969: fifteen at Canaan Mountain in Tucker County, and eight at Cranberry Glades in Pocahontas County. Trapping reports indicate that the fishers have reproduced and that establishment of a population has been achieved, apparently from the release in Tucker County. The last known observation for the Cranberry Area occurred in 1977,[18] and these animals have either failed to survive and reproduce, or have merged with the northern population. The established fisher population has shown significant pioneering behavior by range expansion of nearly 1,350 square miles of habitat in the nine years following reintroduction.[18]

In 1975, a mandatory check was placed on fishers taken during the regular trapping season. Reports in 1976-77 and 1977-78 were discouraging, but in 1978-79 nine fishers were trapped and in 1979-80 there were 15 reported, five of which were in Maryland.

A comprehensive study[19] on the Cheat Mountain salamander is summarized below. The total range of the Cheat Mountain salamander is reported to be a 20 x 50 mile area in the mountains of northeastern West Virginia. This range includes part of the Highland Scenic Highway study area from Thorny Flat north through the Shavers Fork watershed, bounded by Back Allegheny Mountain on the east and Cheat Mountain on the west. The salamander's range continues north of the study area to McGrowan Mountain, Mozark Mountain and Dolly Sods. Only twenty disjunct populations are known to occur within this range. Four of these known populations are located in the study area: two on Back Allegheny Mountain, one at Thorny Flat, and one at Barton Knob.

The Cheat Mountain salamander was found to occur in mixed deciduous forest and red spruce forest above 3,400 feet. It is assumed that the presence of deciduous forest at these elevations is a result of the timbering of the red spruce forest. There was no correlation found between an occurrence of the Cheat Mountain salamander and red spruce other than both are restricted to high elevations. The Cheat Mountain salamander requires a more moist habitat than those species associated with it, the red-backed salamander and the mountain dusky salamander and is confined to its present boundaries by competitive pressures from these associate species.

d. Other Wildlife

The project area supplies habitat for numerous other game and non-game wildlife species.

The white-tailed deer is economically the most important big game animal in West Virginia. In 1975, approximately 195,000 hunters received recreational opportunities from deer hunting and contributed more than $20 million to the State's economy.[20] Pocahontas and Randolph Counties ranked sixth and fourth highest county in the State for antlered deer gun harvest in 1979. Deer density in the study area is highest in the oak-hickory forests and relatively low in the Shavers Fork watershed.

Ruffed grouse inhabit the area and field work associated with this study always resulted in observations of grouse. They were flushed along thickly vegetated stream banks, as well as in the clear cuts and recent selective timber cuttings. Many were seen picking up gravel or dusting along roads. Although a detailed analysis of grouse population levels was not within the scope of this study, general estimates are that density at the most approaches one pair per 100 acres, and that the area in general is presently substantially below carrying capacity.[21] Although hunting reports indicated a substantial decline in the grouse population in the Mountain Region of West Virginia in the 1978-79 season, the 1979-80 season is expected to show higher populations, particularly in Randolph County.[22]

The bobcat is primarily an animal of the forest although it does frequent forest opening, and make preferred use of roads as travel routes between the several habitat types which may be included in its home range.[23] Based on harvest records, bobcats occur in West Virginia in all counties except nine, but are most abundant in mountainous regions and eastern counties. Pocahontas County has the highest 1978-79 bobcat harvest in the state and Randolph County ranked second. Bobcat tracks were observed in two areas of Back Allegheny Mountain during field studies in 1979. Both sightings were near thickly vegetated areas that had been heavily timbered within the last five years. The abundance of grouse, squirrels, deer and rodents together with the large and varied areas of heavy cutover vegetation and open woods, indicate that a large population of bobcats could exist in the project area.

The presence of beavers in the project area is evidenced by numerous beaver ponds scattered throughout the Shavers Fork watershed. Beaver harvest in the study area is influenced by the value of the fur and by weather. At the present time, the value of beaver pelts is increasing and beaver harvest in the area can also be expected to increase. Beaver harvest was 140 in Pocahontas County and 61 in Randolph County in 1978-79, ranking as the second and fourth county harvests in the state.

The area provides good red squirrel habitat. Field observations in the Shavers Fork Watershed indicated the squirrels were mostly concentrated in the spruce-northern hardwood timber types and were frequently observed eating parts of the spruce's seed cones. Most of the squirrel sightings took place along the main coal hauling dirt roads. Many hollow birch and beech trees provide dens for both the squirrels and raccoons.

Other species that commonly occur in the study area include red fox, gray fox, mink, skunk, oppossum, chipmunk, deer mice, shrews, and a variety of other small mammals, reptiles and amphibians. A number of hawks, owls, wood ducks, and waterfowl common to the mountainous area of the State occur here.

Songbirds are numerous, including some rare in West Virginia such as the red crossbills and pine grosbeaks. A number of ornithological reports have been written about the Gaudineer Knob area, just north of U.S. Route 250.[24] These articles expound on the rich variety of avian life in the area and make particular mention of the abundance of trushes and warblers. This area offers perhaps one of the best opportunities for the passive recreation of bird watching found in the State and perhaps of the eastern United States.

e. Opportunities and Management Needs

The study area is located within the Upper Shavers Fork (Unit #10) and Elk River (Unit #12) Planning Units of the Monongahela National Forest. Management direction regarding wildlife is included in the Sub-Unit Plan for the Upper Shavers Fork Unit[24] and in the Land Management Plan of the Monongahela National Forest.[1] The Sub-Unit Plan for the Elk River Unit is not complete, although general planning goals and policies are given in the Forest Land Management Plan.

These management plans cannot be exercised in most of the Highland Scenic Highway Study area because this area of land, although within the National Forest boundary, has not yet been purchased and remains in private ownership. Acquisition of the Shavers Fork watershed and associated mineral rights is listed as a priority in the Forest Plan. Nevertheless, the goals and policies of the National Forest and Unit plans are the result of careful study and consideration by qualified wildlife biologists familiar with the status of the resident wildlife populations and therefore are appropriate guidance for wildlife management regardless of current land ownership.

The primary policy is to manage for featured species associations for each unit. General management direction given in the Forest Plan for the two units in the study area include:

Upper Shavers Fork - Unit #10

- Public access will be controlled to protect wildlife habitat.
- The wildlife species association to be featured is black bear.
- Purchase private surface and sub-surface holdings on a willing seller basis.

Elk River - Unit #12

- Wildlife species associations to be featured are black bear, turkey, snowshoe hare, and deer.

- Constrain public access into areas of important bear, native trout, and turkey habitat.

Standards given for the related species associations include the following:

Black Bear Association

- Keep transportation system at a minimum. Control traffic to short time periods. Constrain general public vehicular use to minimize people-bear frictions.

- Create as much vegetative edge and diversity as possible, using variety of cutting methods, and where evergreen vegetation is lacking, increase coniferous composition to about 15 percent of the area in 30 to 100 acre stands. Retain scattering of standing snags along edge of clearcuts.

- Protect and enhance dense, low understory evergreen cover where such cover is scarce.

- Favor mast-producing trees and shrubs.

- Revegetate roads, skid roads, and landings with herbaceous species of value to black bear.

Turkey Association

- Control public vehicular use by providing no more than six miles of continuously open road per 10,000 acres of forest land.

- Maintain scattered herbaceous areas. From 5 to 25 percent of the area should be either permanent or transient interspersed herbaceous openings.

- Protect spring seeps, maintaining a fully stocked stand around them, or manage to increase or perpetuate mast.

- Evergreen cover in small blocks should be encouraged.

- Favor mast-producing trees.

Varying Hare Association

- Increase mixture of hardwoods and dense coniferous stands at elevations over 3,500 feet and have frequent cutting cycles that create a continuing series of small clearcuts.

- Encourage scattered herbaceous openings.

- Retain rhododendron communities.

Deer-Ruffed Grouse Association

- Encourage mast-producing trees and shurbs.

- Revegetate roads, skid roads, log landings or other disturbed soils with legumes and other herbaceous plants.

- From 5 to 25 percent of the area should be in either permanent or transient interspersed herbaceous openings.

- Old field type habitat should be maintained.

The sub-unit plan for the Upper Shavers Fork Unit further defines specific wildlife management direction for the study area. The principal management technique recommended to encourage black bear breeding population is to control access through management of the transportation system.

9. Water Resources/Hydrology

Detailed data and analyses on water quality in the study area are contained in the Technical Report "Water Resources Assessment" prepared as part of this study.[61]

a. Surface Water

(1) General Description

The study area encompasses drainage areas of four major watersheds: Elk River; Greenbrier River; Shavers Fork of Cheat River; and Tygart Valley River. Area streams and watershed delineation are shown on Figure 15. In early August of 1980, the majority of streams within the area were surveyed for the evaluation of existing stream conditions (Table 27). Collectively, the streams of the study area can be generally described as relatively high quality, fast-flowing, headwater streams with rocky bottoms and a dominance of riffle areas.

The Heritage Conservation and Recreation Service included the Shavers Fork from Faulkner to the headwaters above Spruce in the Final List of Potential Wild and Scenic Rivers in January, 1979, which listed rivers meeting minimum criteria for further study and/or potential inclusion into the National Wild and Scenic Rivers System. However, study has not been mandated under the National Wild and Scenic River Act.[25]

TABLE 27

CHARACTERISTICS OF STUDY AREA STREAMS [a]

Watershed	Stream	Length (miles)	Average Width (feet) [b]	Average Depth (inches) [b]	Depth of Pools (inches) [b]	Percent Riffle [b]	Bottom Type	Bank Vegetation	Percent Shade	Fauna
Elk River	Old Field Fork	9.2	5-8	3-6	6-8	80	Rocks, Gravel, Silt	Woods, Brush, Meadow	50	Fish
	Big Spring Fork	9.6	8-15	6-8	8-10	90	Rocks, Silt	Woods, Brush, Weeds	20-30	Riffle Beetles, Caddis fly, May-fly, Stonefly, Crayfish
	Cup Run	1.9	15-20	Dry	Dry	Dry	Med. to Lg. Rocks Silt	Field, Scattered Trees	10	-
Greenbrier River	Cloverlick Creek	9.6	15-20	8-12	12-18	40	Sm. Rocks, Gravel Silt, Algae	Meadow, Small Trees	0-5	Crayfish, May-fly, Riffle Beetles
	Elklick Run	2.8	4-10	4-6	8-10	20	Med. to Lg. Rocks	Mature Trees, Brush	80-90	Fish
	Trout Run	2.2	10	3-5	-	100	Rocks, Silt	Meadow, Small Trees	0-5	-
	Allegheny Run	2.3	3-5	Dry	Dry	Dry	Rocks	Woods	90-100	-
Tygart Valley River	Tygart Valley River	26.4 [e]	8-16	4-8	10-12	90	Med. to Lg. Rocks	Woods, Brush	0-30	-
	Big Run	5	10-20	4-8	8-10	90	Med. to Lg. Rocks	Woods, Brush	80	Fish, Mayfly, Stonefly, Snails
	Windy Run	4.5	10-15	4-6	-	100	Rocks, Algae, Silt	Brush, Few Trees	0-10	-
	Stewart Run [c]	8	-	-	-	-	-	-	-	-
	Becky Creek	9.3	10-25	6-8	15	80	Rocks	Woods, Fields	0-100	-
Shavers Fork	Shavers Fork	25 [e]	15	6-8	18	50	Sm. Rocks, Gravel	Woods, Brush	80-90	-
			15-30	6-10	12-36	50	Med. Rocks, Gravel	Woods, Brush	80-90	Fish
			30-40	8-10	16-20	70	Rocks	Trees, Brush, Grass	-	Mayfly, Caddis fly
	Black Run (upper)	3	20-25	6-8	16	80	Rocks, Gravel	Woods	90-100	Crayfish, Caddis fly
	Rocky Run	1.6	15-25	4-8	12	70	Rocks, Gravel	Woods	80	Caddis fly, Dragonfly
	Second Fork	4.0	12-25	6-8	10-14	95	Med. Rocks, Gravel	Woods	60	Caddis fly, Mayfly
	Beaver Creek	1.5	3-15	5-8	10-18	70	Rocks, Gravel, Silt	Woods, Brush	90-100	Fish
	Black Run (lower)	1.1	15-25	4-6	12	90	Rocks, Gravel, Silt	Woods, Brush	100	-
	First Fork	5.2	20-40	6-10	16	70	Rocks, Gravel	Woods	60	Mayfly, Caddis fly
	Lambert Run	3.3	8-16	4-6	8	70	Sm. Rocks, Gravel, Silt	Woods, Brush	90-100	-
	Fish Hatchery Run	2.4	10-20	5-10	12	80	Rocks, Gravel	Woods, Brush	100	Mayfly, Caddis fly
	Blister Run	1.7	4-6	4-6	8	40	Rocks, Gravel	Woods, Brush	90	Mayfly
	Red Run [d]	2.6	-	-	-	-	-	-	-	-

a Locations of survey sites are shown on Figure #1.
b As of August, 1980.
c Not surveyed. Characteristics similar to Becky Creek.
d Not surveyed. Characteristics similar to Lambert Run.
e Length within project area.

The only significant lentic habitat in the project area is offered by the 6-7 acre man-made Shavers Lake, near the headwaters of Shavers Fork, and scattered beaver ponds. Relatively shallow, Shavers Lake is characterized by a muddy substrate, somewhat turbid waters, and a relative paucity of benthic flora and fauna. Small ponds constructed for erosion prevention near strip mines offer possible future aquatic habitat for smaller forms of aquatic fauna.

Streams of the Shavers Fork watershed were identified early in the study as those most susceptible to impact of the proposed extension of the Highland Scenic Highway. These streams were therefore investigated in greater detail than others in the study area. The field survey indicated no special problems in the study area streams of the Elk River, Tygart Valley River, and Greenbrier River watersheds, and all appeared to support relatively productive aquatic communities.

(2) Existing Surface Water Quality

Borderline stream water quality of the area streams has become a limiting factor on the indigenous aquatic life, particularly in the Shavers Fork watershed. Deterioration of water quality within the Shavers Fork has been generally a gradual process that still persists.[26] Higher stream temperatures, increased acidity, and sedimentation have severely impacted these cold-water, trout streams. Water quality information for the Shavers Fork watershed is shown in Tables 28 and 29.

(a) Temperature

The Shavers Fork is a relatively shallow, wide stream along its main water course (an approximate 50 foot width just below Lambert Run), and therefore, receives minimum shade from existing riparian vegetation. Additional stream exposure is created by sections of the Western Maryland Railroad corridor. The general north-south orientation of the Shavers Fork allows maximum mid-day solar radiation on much of the open stream waters. The major stream flow of the Shavers Fork presently reaches relatively warm temperatures in the summer months (over 23.9°C [75°F]), reaching critical limits for trout survival[24] and exceeding the State Water Quality Criteria for trout waters (Table 28). Maximum stream temperature for the Shavers Fork tributaries is generally 10° to 15°F cooler than the main waters.

(b) Erosion and Sedimentation

Within the Shavers Fork watershed, high suspended sediment concentrations have historically occurred during periods of high flow. Part of the sediment loading is caused by normal erosional processes. However, much of the sediment is generated from hauling roads, and active mining and timber harvesting operations on lands upstream from Route 250.

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Highland Scenic Highway: draft environmental impact statement: extension of the Highland Scenic Highway, West Virginia Route 150 from US Route 219 to US Route 250: Monongahela national forest, Pocahontas and Randolph Counties, W.V. 1981. USDA Forest Service; cooperating agency DOT, Federal Highways Administration; responsible official Steve Yurich. 400 pages.

REFERENCE SOURCE OF THE REQUESTED PUBLICATION, IF AVAILABLE

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DEPARTMENT OF AGRICULTURE. FOREST SERVICE

DEPARTMENT OF TRANSPORTATION. FEDERAL HIGHWAY ADMINISTRATION

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(PUR)CONSTRUCTION OF A 35.2-MILE EXTENSION OF THE HIGHLAND SCENIC HIGHWAY (WEST VIRGINIA ROUTE 150) IN POCAHONTAS AND RANDOLPH COUNTIES, WEST VIRGINIA IS PROPOSED. THE EXTENSION, WHICH WOULD PASS THROUGH THE MONONGAHELA NATIONAL FOREST, WOULD BEGIN AT THE PRESENT TERMINUS OF THE HIGHWAY AT U.S. ROUTE 219 AT A POINT SEVEN MILES NORTH OF MARLINGTON IN POCAHONTAS COUNTY AND PROCEED TO U.S. ROUTE 250 NEAR BARTON KNOB IN RANDOLPH COUNTY. THE PREFERRED ALIGNMENT WOULD GENERALLY FOLLOW THE RIDGE LINE ALONG CHEAT MOUNTAIN. THE TWO-LANE EXTENSION WOULD BE DESIGNED ESPECIALLY FOR USE BY BUSES AND WOULD HAVE A DESIGN SPEED OF 30:N-40 MILES PER HOUR. ONE GRADE SEPARATION STRUCTURE WOULD BE CONSTRUCTED. THE CORRIDOR WOULD FEATURE A STANDARD SCENIC HIGHWAY RIGHT-OF-WAY WIDTH OF 1,000 FEET, AND DEVELOPMENT OF THE RIGHT-OF-WAY WOULD INVOLVE RECLAMATION OF 672 ACRES OF SURFACE MINED LAND THAT HAS YET TO BE ADEQUATELY RECLAIMED. RIGHT-OF-WAY REQUIREMENTS WOULD ENCOMPASS 40,594 ACRES OF LAND, MUCH OF WHICH WOULD BE ACQUIRED IN FEE OR ON EASEMENT. THE RECREATIONAL PLAN FOR THE HIGHWAY WOULD INVOLVE CONSTRUCTION OF PICNIC AREAS, SCENIC OVERLOOK FACILITIES, AND INTERPRETIVE TRAILS AND COULD INVOLVE CONSTRUCTION OF A BIKEWAY. ESTIMATED COST OF LAND ACQUISITION AND HIGHWAY CONSTRUCTION IS $57 MILLION. (POS)CONSTRUCTION OF THIS LOGICAL EXTENSION OF THE HIGHLAND SCENIC HIGHWAY WOULD PROVIDE AN OPPORTUNITY FOR THE TRAVELING PUBLIC TO VIEW OUTSTANDING SCENERY OVER A DRIVING DISTANCE OF SUFFICIENT LENGTH TO CONSTITUTE A DAY'S OUTING. THE NATURAL, SCENIC, HISTORIC, AND ARCHAEOLOGICAL RESOURCES WITHIN THE BROAD RIGHT-OF-WAY WOULD BE PROTECTED FROM CONFLICTING LAND USES, AND WATER QUALITY IN SHAVERS FORK RIVER AND MANAGEMENT TECHNIQUES FOR WILDLIFE PRESERVATION WOULD BE IMPROVED. EXPANSION OF TOURISM IN THE AREA WOULD CONTRIBUTE TO THE REGIONAL ECONOMY. ACCESS TO RECREATIONAL AREAS WITHIN THE REGION WOULD BE ENHANCED. (NEG)APPROXIMATELY 21.2 MILES OF THE ALIGNMENT WOULD TRAVERSE HIGHLY ERODIBLE SO

Descriptors: COAL; EASEMENTS; HIGHWAY STRUCTURES; HIGHWAYS; LAND ACQUISITION; LIMESTONE; RECLAMATION; RECREATION FACILITIES; SCENIC AREAS; WILDLIFE; DEPARTMENT OF

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TRANSPORTATION APPROPRIATION ACT OF 1978--PROJECT AUTHORIZATION; FEDERAL AID HIGHWAY ACT OF 1973--FUNDING; FEDERAL WATER POLLUTION CONTROL ACT OF 1972--NPDES PERMITS; FEDERAL WATER POLLUTION CONTROL ACT OF 1972--SECTION 401 PERMITS; FEDERAL WATER POLLUTION CONTROL ACT OF 1972--SECTION 404 PERMITS;

Section Headings: NATURAL RESOURCES(P000)

TABLE 28

WATER QUALITY SUMMARY
SHAVERS FORK*

Parameter	Instream[a] Standards	Trout[a] Waters	Precipitation[b] (Red Run Portal)	Shavers Fork[c] (below Snowshoe Resort)	Buck Run[c]	Fish Hatchery[c] Run	Shavers Fork[b] (Cheat Bridge)	Red Run[b]
Beg./End			78/05 - 79/12	78/05 - 78/09	78/95 - 78/10	78/05 - 78/10	75/06 - 79/10	69/05 - 79/10
Temp. (°F)	d	e	46.0(46.0-46.0)/1				49.9(68.0-32.0)/51	49.7(64.0-32.0)/70
Turb. (JTU)	f	f		5.0(11.0-2.0)/3	1.5(2.0-1.0)/4	13.(25.-8.)/4	13.4(120.0-1.0)/22	2.7(4.5-1.2)/5
Turb. (Hach FTU)			1.0(1.0-1.0)/1				10.2(40.0-1.4)/49	4.5(10.0-1.2)/22
Cond. (Micromho)			26.0(71.0-10.0)/26				36.2(53.0-24.0)/70	39.6(92.0-22.0)/88
pH (SU)	6.0 - 9.0	6.0 - 9.0						
pH (Lab SU)			4.7(6.5-3.7)/26	7.3(7.6-7.0)/3	5.5(7.2-5.0)/4	6.2(7.8-5.1)/4	6.1(7.7-4.6)/70	5.7(7.6-3.7)/91
T. Alk. (mg/l $CaCO_3$)			1.1(10.0-.0)/23				5.6(12.5-.5)/63	2.6(8.0-.0)/62
T. Acid. (mg/l $CaCO_3$)			6.4(14.5-2.0)/26				4.3(14.0-.7)/64	4.0(11.0-1.0)/62
Sulfate (mg/l)			2.5(5.5-.6)/17	6.3(8.0-5.0)/3	8.5(9.-8.)/4	8.5(12.-5.)/4	6.3(9.0-3.6)/16	6.1(14.1-.5)/25
T. Copper (mg/l)	.005	.005	.015(.060-.010)/17				.012(.020-.010)/9	.017(.120-.002)/18
T. Iron (mg/l)	1.0	0.5	.066(.210-.010)/17	.52(.76-.28)/3	.15(.38-.06)/4	.60(1.10-.30)/4	.833(7.400-.130)/17	.628(2.230-.130)/25
T. Lead (mg/l)	.025[g]	.025[g]	.006(.010-.005)/14				.013(.025-.005)/12	.026(.100-.005)/19
T. Manganese (mg/l)	.05	.05	.013(.030-.010)/14				.049(.100-.020)/14	.100(.160-.020)/22
T. Zinc (mg/l)	.050[h]	.050[h]	.021(.040-.010)/17				.019(.050-.010)/10	.031(.120-.005)/22
T. Aluminum (mg/l)		.56	.123(.360-.050)/17	.19(.32-.10)/3	.34(.42-.26)/4	.94(2.20-.32)/4	.683(5.000-.100)/17	.576(3.600-.080)/23
Susp. Sed. (mg/l)	35[i]						33.0(119.7-12.1)/14	11.9(11.9-11.9)/1

*Mean (Range)/# Samples

[a] Dept. of Natural Resources. 1980. Proposed Administrative Regulations of the State of West Virginia for Water Quality Criteria on Inter- and Intra-state Streams. Division of Water Resources, Charleston, WV. The listed criteria shall apply except where lesser quality is due to natural conditions.

[b] STORET Retrieval by USFS, Elkins, WV.

[c] DNR, Elkins, WV.

[d] No greater than 5° above the natural; not to exceed 87° (May-Nov.) or 73° (Dec.-Apr.).

[e] No greater than 5° above the natural; max. daily mean not to exceed 50° (Oct.-Apr.) or 58° (Sept.-May) or 66° (June-Aug.)

[f] Max. of 10 NTU over a background of 50 NTU or less; max. 10% increase over a background of more than 50 NTU.

[g] At a hardness of 0-100 mg/l $CaCO_3$.

[h] At a hardness of 0-150 mg/l $CaCO_3$.

[i] U.S. Forest Service. 1979. Evaluation of Surface Water Resources of the Shavers Fork. Monongahela National Forest, Elkins, WV.

TABLE 29

WATER QUALITY ANALYSIS*
SHAVERS FORK STREAM SAMPLES

Site[a] No.	Sample Site	mg/l[b]					
		pH	Al	Cu	T. Fe	Pb	Zn
1	Shavers Fork below Shavers Lake	6.65	0.5	<0.01	0.88	<0.05	<0.01
2	Shavers Fork at Spruce	6.70	<0.2	<0.01	0.75	<0.05	0.02
3	Second Fork	6.60	0.4	<0.01	0.55	<0.05	<0.01
4	Shavers Fork	6.95	<0.2	<0.01	0.15	<0.05	0.01
5	Black Run (lower)	5.15	0.5	<0.01	0.65	<0.05	<0.01
6	Roadside ditch runoff	4.35	1.0	<0.01	1.64	<0.05	<0.01
7	First Fork	5.85	<0.2	<0.01	0.48	<0.05	<0.01
8	Fish Hatchery Run	4.65	0.2	<0.01	0.38	<0.05	<0.01

*GFC&C single grab samples, collected Aug. 5-15, 1980.

[a] Locations of sample sites are shown on Figure #1.

[b] All data obtained in lab.

Periods of extreme muddiness have occurred in sections of the Shavers Fork and Cabin Fork (Second Fork) due to timber harvesting activities which included dredging of the stream bed to obtain stone and gravel for related road building.[28, 29] In addition to the heavy sedimentation, the stream beds have widened and shade has been reduced. Strip mine operations within the project area have created sedimentation problems in the past, but it has been reported[30] that 80 to 90 percent of this sedimentation has since been mitigated at most of these sites.

Much of the present sedimentation within the Shavers Fork is from the construction and use of hauling roads for both timber harvesting and mining purposes.[30] In the early spring and mid summer of 1980, field investigations of the project area revealed erosion and sedimentation problems associated with the road network in the Shavers Fork Watershed south of U.S. Route 250. Road stream crossings often wash out during periods of high stream flow, but are soon reconstructed. Sections of existing roads have soft mud and clay foundations and require repeated grading for continued coal and timber hauling. The closeness of the roads on both sides of the Shavers Fork permits direct sedimentation into the stream.

Water quality data for the Shavers Fork at Cheat Bridge (Table 28), shows a relatively high mean for suspended sediment. Additional data[31, 32] indicates turbidity levels exceeding the instream standard now set (Table 28).

(c) Acidity

Some of the area's streams, particularly the Shavers Fork are relatively infertile, with limited productivity. Stream productivity, or diversity and population levels of aquatic life, can be limited by many environmental factors. A major factor limiting stream productivity in the project area is acidity. Infertile streams are generally described[32] as having a pH of 6.0 or less, an alkalinity of 15 mg/l $CaCO_3$ or less, and a conductivity of 50 micromho/cm or less. The water quality data in Table 28 indicates that parts of the Shavers Fork watershed are relatively infertile. Acidity of area streams results from: natural leaching of geologic formations[31] which may be accelerated by increasing disturbance of the formation,[24, 29] and increasing depositions of acid forming air pollutants.[32]

Because of the atmospheric input of sulfur and nitrogen oxides from vehicular and industrial sources, precipitation and dry fall, particularly over the northeast United States, has become signifi-

cantly more acidic.[36] [37] Rainfall within the project area presently has average pH values in the mid 4's (Table 28); creating severe water quality problems because of naturally occurring poor buffering capability of streams within the Shavers Fork watershed.[32] Significant drops in pH have been noted after heavy rainfalls and rapid snow melts[31] and the greatest stream acidity occurs during snowpack melt periods, usually in the months of March and April. This winter-stored acid has lowered the Shavers Fork mean daily pH to as low as 4.3 at Bemis, West Virginia.[31] In addition to acid surface water conditions, acid precipitation can affect the leaching process of soils and rock exposures by dissolving more mineral and nutrient matter for transport.

Water quality, particularly the acidity of streams within the study area, is significantly influenced by watershed geology. A generalized cross section of watershed geology for the study area can be seen in Figure 16. The Pottsville Group is underlain by the Mauch Chunk Group, which in turn is underlain by the Greenbrier limestone. Thus, the higher elevations of the project area are characterized by the outcrop of the Pottsville Group on the mountaintops and the Mauch Chunk on the lower side slopes and valley floor. Drainage land for the Shavers Fork above Cheat Bridge totals 37,000 acres: 57% in the Pottsville Group and 43% in the Mauch Chunk Group (Figure 9).[31] Remaining project area watersheds are lower in elevation and the Pottsville Group is no longer as evident.

Approximate water quality values are given in Table 30 for surface drainage from watersheds of different geologic origin. The drainage from the Pottsville lithology tends to be much more acidic, with little buffering capacity, than drainage from the Greenbrier limestone or even the Mauch Chunk Group. As early as 1934, many streams in the Shavers Fork system were acidic enough to prohibit sustenance of fish life.[27] This was at a time before local precipitation actually reached levels of acidity to create any significant impacts. The presence of the Greenbrier limestone in the lower elevation watersheds gives these streams greater buffering capacity than the higher elevation Shavers Fork, and acidity is not as critical as a limiting water quality factor.

Acidity from the Pottsville Group has been attributed to pyrite and marcasite bearing rocks within the Shavers Fork Watershed.[28] The introduction of mining, timber harvesting, and road construction activities in this rock type can elevate the natural acid loading of streams by exposing additional acidifying materials and increasing direct runoff into streams.[28]

Although the Pottsville coals within the project area have been described as low in pyrite or other acid forming materials,[39] recent field investigations revealed small pyritic deposites at the Rehobeth Coal stripmine near Crouch Knob, and an earlier report[29] identified pyritic coals at a stripmine along Fish Hatchery Run.

TABLE 30

WATER QUALITY RELATIVE TO GEOLOGIC ORIGINS

Geologic Origin	Water Quality[a]		
	pH	T. Acidity (mg/1)	T. Alkalinity (mg/1)
Pottsville Group	4.2 - 5.3	5.6 - 11.4	0 - 1.2
Kanawha Formation	4.0 - 5.0[b]		
New River Formation	5.0 - 6.5[b]		
Mauch Chunk Group	6.2 - 7.3 6.5 - 8.0[b]	2.3 - 9.6	14.8 - 23.7
Greenbrier Group	7.7 - 8.1	1.5 - 5.0	82.0 - 122.7

[a]U.S. Forest Service, Monongahela National Forest, Elkins, WV, Meeting with D. Maddox, Hydrologist, on July 15, 1980.

[b]Brannon, D., D. Dunshie, D. Gasper, and T. Manley. Monongahela National Forest Acid Precipitation, Hydrology, and Water Quality. Presented at the 1978 Northeast Fish and Wildlife Conference, White Sulphur Springs, WV.

Acid mine drainage has been reported at several coal mines within the Shavers Fork watershed.[28 29 40 41] Presently, the only deep mines known to exist within the Shavers Fork watershed south of U.S. Route 250 are two abandoned mines along a tributary to Red Run,[40] two abandoned mines along Fish Hatchery Run, and two working mines at White Top Mountain that began in 1973 to 1974.[24] One additional deep mine permit for White Top Mountain had been issued.[24] No other deep mines are foreseen for this area in the near future. A large increase in surface mining, however, is most likely to take place over the next few years.

The levels of acid mine drainage in this area are low when compared to typical cases of acid mine drainage elsewhere in West Virginia and Pennsylvania. When compared to the effects of acid precipitation, the relatively low net acid load from the acid producing mines does not have a significant impact on water quality of the Shavers Fork and tributaries.[31] Unfortunately, because of existing borderline water quality within this watershed of low buffering capability not much additional pollution input is required to upset the sensitive equilibrium and create unfavorable habitat conditions for aquatic organisms, particularly fish.[26]

Properly managed timber harvesting operations normally do not disrupt deeper soil layers as do road construction and mining operations. However, it has been found that even the disturbance of upper soil layers in regions of Pottsville bedrock is enough to cause runoff of a slightly greater acidity.[26] Water flowing over an ungraveled hauling road was found to increase in mineral acidity by as much as one full pH unit.[30] In contrast, results from another study suggest that soil water from an undisturbed soil aquifer, surface flow from exposed acid soil, and leachate from an acid soil all have cold total acidity concentrations within the range of surface water from an undisturbed Pottsville watershed.[31]

Hauling roads within the project area disrupt a relatively small proportion of soil acreage and, with proper design, do not add significant amounts of acid runoff to the already acidic streams. Unfortunately, many of these existing roads and current road construction practices incorporate insufficient erosion control measures, often resulting in uncontrolled runoff. Within the project area, roads along the Shavers Fork cut into the Mauch Chunk Group, and thus do not contribute to the mineral acid problem. However, if fill material originating from the Pottsville Group is used for these roads, especially near stream crossings, then possible added stream acidity may result.

(d) Heavy Metals

In addition to the sulfuric and nitric acids found in atmospheric deposition, other pollutants may be present to adversely affect aquatic ecosystems. Heavy metals and other trace elements that can accompany meteoric acids may reach toxic levels especially where acid precipitation accelerates the leaching of these elements from the soil into streams and lakes. These potential pollutants include copper, nickel, lead, zinc, cadmium, mercury, selenium, manganese, iron, and aluminum.[36 42] Studies indicate that aluminum is a primary element of this effect and the result can be high concentrations of dissolved aluminum in surface and ground waters,[43] particularly in regions where the watershed is characterized by acid, base-deficient soils.

Within the project area, water quality records for the Shavers Fork indicate higher than normal iron and aluminum concentration in solution.[26 44] In addition, water data for the river and some of the tributaries currently shows that copper, zinc, lead, and manganese concentrations exceed instream standards.[24 31 32] Tables 28 and 29 show lead, maganese, zinc, and especially copper, iron, and aluminum, exceeding these standards.

Increased stream turbidity has been shown to coincide with precipitation events in the study area.[32] High iron and aluminum concentrations have been linearly correlated with incidents of increased stream turbidity.[26 31 32] The increased iron concentrations in the Shavers Fork are caused by soil erosion from surface disturbance activities and by the great volume of iron bearing rocks in the bedload. Total suspended solids pollution can elevate both total iron and aluminum concentrations in the river.[31] A natural stream loading of aluminum also exists in the Shavers Fork.[45] The manganese, lead, copper, and zinc concentrations are thought to result mostly from natural sources.[31 32]

It appears that highest heavy metal concentrations in the Shavers Fork exist at Cheat Bridge, just below commercial timber harvesting and mining operations. These concentrations decrease further downstream because of the effects of dilution.[32 44] The iron and aluminum are not chemically bound to the sediment and are evidently being leached from disturbed soils of upstream lands.[32]Surface mining often increases heavy metal deposition into streams.[26 45] The introduction of total suspended solids and associated increases in total iron and aluminum is the major pollution threat to the Shavers Fork from additional coal mines.[31] Road construction has also been indicated as a source of additional loading of heavy metals, particularly iron and aluminum, to the Shavers Fork.[46 47] Construction of the newly completed adjacent section of the Highland Scenic Highway has been associated with incidents of large increases in total iron and aluminum for some local streams. [45]

Heavy metal concentrations have been associated geologically with the Pottsville Group and are elevated by the effects of acid precipitation.[44] The Pottsville sandstones have been found to contain relatively high amounts of iron sulfides.[45] The iron-rich Mauch Chunk Group is also a source of iron loading to the Shavers Fork.[32] Red shales of these formations generally contain 10 percent hematite,[48] the principal ore for iron.

In an attempt to identify sources of heavy metals in the project area, a worse case condition analysis for heavy metal leaching was completed on several soil and bedrock samples collected from the project

area (Table 31 and Figure 9). Dilute sulfuric acid, often a constituent of acid precipitation, was used as the leaching agent; pH 3.7 represents the lowest recorded pH for precipitation in the project area (Table 28). The data shows variable results with high levels of iron and aluminum for several samples and high copper and zinc levels for all the samples. The Bluefield Formation of the Mauch Chunk Group yielded iron and aluminum concentrations far above other samples tested.

3) Existing Aquatic Community

Study area streams provide recreation for anglers, and the area is well-known for its fishery resources. Several of the headwater streams and tributaries support native brook trout populations. Other streams are stocked with brown, rainbow, golden, and tiger trout.

The West Virginia DNR Division of Wildlife Resources, and State chapters of Trout Unlimited have a major wild trout project in Elk River below Slaty Fork. Elk River below this section is one of the heaviest stocked and fished trout streams in West Virginia. The Tygart Valley River from Logan Run downstream is stocked annually with approximately 10,000 trout. The Tygart Valley River below the stocked section supports a small mouth bass and rock bass fishery, and is considered a high quality stream. The Shavers Fork is stocked annually with some 28,000 trout directly below Cheat Bridge. The Greenbrier River from Elk Creek upstream is stocked annually with approximately 21,000 trout. The main Greenbrier River below the stocked section supports a small mouth bass and rock bass population and is considered a high quality stream.

A survey conducted in 1975[49] in the Shavers Fork watershed indicated low productivity due to natural and man-induced characteristics of the watershed. Only at Station 2 were trout sufficiently abundant in Shavers Fork to provide some sport fishing opportunity. Stocking of hatchery trout in the Shavers Fork south of U. S. 250 was discontinued in 1972. The presence of trout in this section reflects upstream movement of hatchery fish and/or stream spawned trout. Table 32 shows the taxa summary for the 1975 survey.

Trout have very specific habitat requirements and are extremely sensitive to changes in the aquatic environment. These requirements include related physical, chemical, and biological characteristics of the stream. Water quality ranges needed for productive trout waters on the Monongahela National Forest are shown in Table 33. Perhaps the most important of these parameters are temperature and dissolved oxygen. Within the study area, the pH of stream waters also becomes very important, because of the relatively high acidity that exists. Water quality is often directly related to physical characteristics of the watershed and channel. Maintenance of a cold stream water temperature is dependent on stream bank vegetation providing shade. Dissolved oxygen is very much influenced by stream gradient and riffle areas. pH is often determined by the soils and geology of the watershed.

Another significant habitat requirement of trout is a healthy and plentiful food source. Fish are dependent on a productive, diversified community of benthic macro-invertebrates, which in turn are also dependent on the chemical and physical characteristics of the stream. Benthic surveys[28] of the Shavers Fork indicate a decreasing productivity within the stream from its headwaters to Cheat Bridge.

TABLE 31

EARTH SAMPLE ANALYSIS FOR HEAVY METALS*

Site No.	Sample Description	Geologic Mapping Unit	Soil Mapping Unit	mg/l[b] Al	Cu	T.Fe	Pb	Zn
1	Exposed red shale bedrock	Mauch Chunk Group Bluefield Formation		4.90	0.04	7.99	<0.05	0.21
2	Sandy-loam soil, 8-12 inch depth	Pottsville Group New River Formation	Leetonia Complex	1.30	0.03	0.75	<0.05	0.52
3	Silt-loam soil, 8-12 inch depth	Greenbrier Group	Calvin Series	1.40	0.04	0.97	<0.05	0.59
4	Exposed red shale bedrock	Mauch Chunk Group Hinton Formation		0.90	0.04	0.47	<0.05	0.30
5	Silt - loam soil, 10-14 inch depth	Mauch Chunk Group Princeton Formation	Meckesville Series	0.70	0.03	0.25	<0.05	0.69
6	Exposed fragipan, 7 foot depth	Pottsville Group New River Formation	Ernest Series	0.30	0.03	0.33	<0.05	0.19
7	Exposed subsoil sandstone, 5 foot depth	Pottsville Group New River Formation	Ernest Series	<0.2	0.11	2.22	<0.05	0.60
8	Silt - loam soil, 24 inch depth	Pottsville Group New River Formation	Ernest Series	0.90	0.04	0.32	<0.05	0.46

*GFC&C single grab samples, collected Aug. 5-15, 1980.

[a]Locations of sample sites are shown on Figure #9.

[b]Data obtained by means of leachate analysis using sulfuric acid at a pH of 3.7.

TABLE 32

SUMMARY TAXA CHECKLIST
1975 SHAVERS FORK FISH SURVEY

Common Name (Genus species)	Station 1	2	3	4	5	6	7	8
White sucker (*Catostomus commersoni*)	x	x	x	x	x		x	
N. hog sucker (*Hypentelium nigricans*)	x	x	x					
River chub (*Nocomis micropogon*)	x	x	x					
Creek chub (*Semotilus atromaculatus*)	x	x	x	x	x	x	x	x
Stoneroller (*Campostoma anomalum*)	x	x	x	x				
Longnose dace (*Rhinichthys cataractae*)	x	x		x	x			
Blacknose dace (*Rhinichthys atratulus*)	x	x	x	x	x	x	x	x
Cheat minnow (*Rhinichthys bowersi*)	x	x	x					
Rosyside dace (*Clinostomus funduloides*)	x							
Rosyface shiner (*Notropis rubellus*)	x	x	x					
Rainbow trout (*Salmo gairdneri*)	x	x	x					
Brown trout (*Salmo trutta*)		x						
Brook trout (*Salvelinus fontinalis*)		x		x	x		x	x
Fantail darter (*Etheostoma flabellare*)	x	x	x	x	x			
Sharpnose darter (*Percina oxyrhyncha*)		x	x					
Sculpin (*Cottus*)	x	x	x	x	x			
Total Species	13	15	12	8	7	2	4	3

Stations 1,2,3: Shavers Fork
Stations 4,5 : First Fork
Stations 6,7: Lambert Run
Station 8: Fish Hatchery Run

Source: Phares, D. and R. Menendez. 1975. Upper Shavers Fork Survey. WV DNR, Wildlife Resources Division, Elkins, WV.

TABLE 33

NATURAL WATER QUALITY RANGES
NEEDED FOR PRODUCTIVE TROUT WATERS
ON MONONGAHELA NATIONAL FOREST

Water Quality Preferences	Brook Trout	Brown Trout	Rainbow and Golden Rainbow
1. Water Temperature			
Preferred Range	55° - 66° F	60° - 70° F	53° - 70° F
2. Dissolved Oxygen			
Preferred Range	6 ppm & over	6 ppm & over	6 ppm & over
3. Acidity (Hot total acid test)			
Preferred Range	pH 6.0 - 8.5	pH 6.0 - 8.5	pH 6.0 - 8.5
4. Alkalinity			
Preferred Range	pH 7.0 - 8.0	pH 7.0 - 8.0	pH 7.0 - 8.0
Preferred Range	20 ppm & over	20 ppm & over	20 ppm & over
5. Sedimentation			
Very Detrimental	100 ppm & over	100 ppm & over	100 ppm & over
Tolerable Range	25 - 80 ppm	25 - 80 ppm	25 - 80 ppm
Preferred Range	0 - 15 ppm	0 - 15 ppm	0 - 15 ppm
6. Turbidity - Jackson Turbidity Units			
Preferred Range	0 - 10 JTU	0 - 10 JTU	0 - 10 JTU
Stress Range	10 - 25 JTU (averaged over a 20 day period)	10 - 25 JTU (averaged over a 20 day period)	10 - 25 JTU (averaged over a 20 day period)
Very Detrimental	50 JTU & over	50 JTU & over	50 JTU & over

Source: Monongahela National Forest, Wildlife Habitat Management Plan, 1978.

4) Cheat Minnow

The Cheat minnow (Rhinichthys bowersi), originally thought of as a species (1908), was later redescribed (1940) as a cyprinid hybrid of the River chub (Nocomis micropogon) and the Longnose dace (Rhinichthys cataractae); both of which occur sympatrically throughout the Appalachian region.[50] For a time it was thought the Cheat minnow did not extend in range below the Shavers Fork falls, approximately 15 miles downstream from Cheat Bridge.[50] However, recent investigations revealed the species occurs in the Cheat River drainage of Tucker County and in the Youghiogheny River drainage of Preston County.[51 52] The Cheat minnow has been relatively common in the Shavers Fork headwaters in the study area, although the most recent survey collected only two specimens in this area.[52]

Based on their preliminary findings from biochemical evidence and morphological/meristic data, members of the Appalachian Environmental Laboratory have indicated that Rhinichthys bowersi appears to be a valid species.[52] However, verification of R. bowersi as an "interbreeding population" is needed to finalize this contention. None the less, it is the recommendation by members of the Laboratory that this minnow be given a Federally protected status (threatened), and that the Cheat River, including the Shavers Fork, be designated as critical habitat.

b. Groundwater

Groundwater parameters are closely related to bedrock type and topography. Sandstone and limestone aquifers produce more water than shales, and wells drilled in valleys are usually more productive than those located on ridges. Water from the Pottsville sandstones generally is the poorest quality because of pyrite and marcasite in the rock. These minerals give the water a high iron content as well as making the water more acid.

The contamination of groundwater in a limestone terrain is a serious problem. Pollutants, such as trash, fertilizer, insecticide, barnyard wastes, and road salts, enter the subsurface drainage system through sinks and flow unfiltered to the spring outlet which may be many miles away and in a different hydrologic basin. Of particular importance is the potential damage that can be caused by pollutants reaching the Edray Fish Hatchery, individual household wells and springs, and municipal water supplies.

Both the quantity and quality of groundwater can be seriously affected by surface and subsurface mines. Not only is acid mine drainage a pollutant but mining operations may substantially lower the groundwater table. Aquifer permeability can change as a result of mining and mine subsidence. Increased sediment availability from excavation procedures and spoil banks can create erosion and sedimentation problems in groundwater and surface water.

c. Edray Fish Hatchery

Concern has been expressed about the water quality of the springs feeding the State Fish Hatchery at Edray. The cavernous nature of the area's limestone bedrock (Greenbrier Group) makes these springs particularly prone to contamination. Ordinarily, soil and rock filters surface water before it is incorporated in the groundwater system. However, in karst regions, sinkholes provide immediate access from surface water to the groundwater system and prevent this filtration from taking place.

The Western Springs (McLaughlin Spring) and Eastern Springs (Averill Spring) provide the water supply for the Edray Trout Hatchery (Figure 17). The recharge area of McLaughlin Spring is located west of Wolfpen Ridge. Dry Creek and Red Lick Run are the streams that feed McLaughlin Spring. Both creeks sink in their streambeds and emerge at the Western Hatchery Spring. Red Lick Run passes beneath a topographic divide to rise at the Hatchery. The recharge area of the Averill Springs is located east of Route 219 in the Indian Draft Valley. The unnamed stream which feeds Averill Spring goes subsurface through a group of joints, crosses beneath Wolfpen Ridge, flows through Salmon Cave and emerges at the Eastern Hatchery Spring.[53]

Two forms of groundwater contamination have been noted at the springs,[54] excessive turbidity, associated with sediment influx, and increased chloride levels, related to the use of salt on U. S. Route 219.

Prior to construction of the adjacent section of the Highland Scenic Highway, McLaughlin Spring had been affected by high turbidity levels only during infrequent periods of very high water. However, once construction of the highway had begun, in the spring of 1977, high turbidity levels were commonly observed following rain storms. Construction of the highway exposed large areas of soil quite susceptible to erosion.[8] Erosion of the soil resulted in increased amounts of suspended sediment in Dry Creek and Red Lick Run, which in turn resulted in the elvated turbidity levels at McLaughlin Spring. The high turbidity levels which correlated well with local storm events, caused higher than normal fish kills and feeding problems at the hatchery.[55] A turbidity problem never developed at the Averill Spring, because the springs' recharge area was not near the highway construction.

As of February, 1980, elevated turbidity levels are still being observed in McLaughlin Spring after storm events, though, the turbidity levels are not as high and do not persist as long as when the problem was initially observed in the summer of 1977.[56] As was the case when the problem began, high turbidity levels are rarely observed at Averill Spring.

Averill Spring has been found to have year-round chloride concentrations higher than McLaughlin Spring or other neighboring springs.[63] Chloride concentrations, however, have not been observed to reach harmful levels. The application of deicing salt on U. S. Route 219 is believed to be the source of the chloride ion because high chloride levels are especially common during periods of rapid snowmelt. It has been suggested that a diffuse groundwater flow is transporting the chlorides from the area adjacent to U.S. Route 219 to the Averill Spring.[63] At the Western Hatchery Springs, high chloride ion levels have not been observed, presumably because a salt source (i.e., U.S. Route 219) is not present in the recharge area.

d. <u>Water Resource Use</u>

The greatest use of the water resources of the study area is for recreation, particularly for fishing. It has been estimated that over 11,000 anglers fished a total of 87,899 days on the Shavers Fork, and 4,600 fisherman spent a total of 58,300 fishing days on the Tygart Valley River in 1975.[57]

Commercial or industrial usage of study area water resources is understandably very limited, considering the relative lack of this type of development in the area. A small coal processing operation near Cheat Bridge uses water from the Shavers Fork. The Snowshoe Company has constructed a reservoir on the headwaters of Shavers Fork for use as a water supply and for snow making equipment. The reservoir has a capacity of 12 million gallons of storage water. Water use from the reservoir by Snowshoe is estimated to be 500,000 GPD in low season and 2.5 million GPD in high season. Future usages of this water resource by Snowshoe is expected to double by 1985.[58]

Groundwater in the study area is used as a water supply through wells and springs by the limited number of residential units in the area.

C. RESOURCES MANAGEMENT PLANS

Various local, state, and federal agencies and private landowners have plans, policies, and standards that provide direction to the management of resources in the area. The most pertinent and comprehensive resources management plans are the U.S. Forest Service's "Monongahela National Forest Land Management Plan", and "Upper Shavers Fork Sub-Unit Plan". The project area is in this sub-unit, however, the plan is not directed to this portion of the sub-unit where land is not owned by the United States. The Land Management Plan provides management direction for natural and human resources of the Forest from 1978 to 1987 under a selected alternative strategy which emphasizes strongly coordinated use of all resources. Both of the Forest Service Plans have precedence in the management of resources where land or land interests are owned by the National Forest and both make preliminary statements against the build alternatives. However, both reserve final judgement for the environmental impact statement phase of the project's development.

Other plans reviewed that have potential effects on the management of resources include the "General Plan" for Randolph County, the "Region IV Overall Economic Development Program" and the "West Virginia State Appalachian Development Plan for Fiscal Year 1980". The two county plans are general guides for future growth, development, and land use changes.

Where land is privately owned, the two county plans have priority in providing a general framework within which private landowners manage resources in accordance with applicable governmental rules and regulations. The latter three plans/programs are primarily economic development plans which present public investment strategies for improving the area's economy.

The alternatives considered for the extension of the Highland Scenic Highway are reviewed fom their consistency with the goals and priorities set forth in these plans and programs in Section II.F.

EVALUATION CRITERIA

SECTION III

III. EVALUATION CRITERIA

The development of evaluation criteria was an important task undertaken early in the study process. Evaluation criteria were established as measures to evaluate and compare alternatives and to determine the magnitude and significance of impacts during the analysis of the alternatives. The evaluation criteria were basic elements in the process of determining the two major decisions to be made in regard to this study: (1) which of the proposed building alternatives was to be recommended for the extension of the Highland Scenic Highway; and (2) whether or not the extension should be constructed. The former decision required the analysis and evaluation of the possible build alternatives to arrive at the selection of a preferred alternative; the second decision required the analysis and evaluation of the no-action, or no-build, alternative in comparison with the preferred alternative.

The evaluation criteria were established on the basis of compliance with existing Federal and State of West Virginia criteria, and U.S. Forest Service standards and procedures. The criteria have been specifically developed to respond to the specific goals, objectives and other characteristics of the overall study. These criteria have been tested for feasibility of application and responsiveness to the study's purposes. This testing has been of particular significance in regard to evaluation of project elements such as recreational development and land acquisition programs which required experience and value judgments.

Not all of the evaluation criteria are equally applicable to each of the two decisions to be made. Since it is unlikely that any build alternative could differ substantially with respect to each of the first six criteria, these criteria then can be used only to decide between the no-build alternative and the preferred build alternative. Any of the build alternatives could, however, differ substantially with respect to criteria 7 through 15, and these criteria could be used effectively in the selection of a preferred build alternative, as well as determining if the proposed highway extension should be built.

These criteria were utilized in Section VI, EVALUATION OF ALTERNATIVE, to arrive at the decisions necessary for this study. Two of the criteria, number 10 - Compatibility with National Radio Astronomy Oberservatory, and number 15 - Legality, were major considerations used in Section IV. ALTERNATIVES CONSIDERED, to limit the range of alternatives considered. All of these criteria were considered, as appropriate, within Section V. EFFECTS OF IMPLEMENTATION, to evaluate the possible effects of the build and no-build alternatives. A list of the evaluation criteria follows:

1. Ability to meet National Forest objectives

    a. Promote and achieve a pattern of natural resource uses that will best meet the needs of the people now and in the future.

    b. Protect and improve the quality of air, water, soil, and natural beauty.

c. Encourage the growth and development of forestry based enterprises that readily respond to consumer's changing needs.

d. Seek optimum forest landownership patterns.

e. Involve the public in forestry policy and program formulation.

f. Expand public understanding of environmental conservation.

2. Ability to meet management priorities established for Appalachian National Forests

   a. Protect and enhance the air, water, soil, and natural beauty, including the unique nonreplaceable natural, historic, and archeologic features.

   b. Create a variety of quality outdoor experiences for rural and urban dwellers with emphasis on simple, restful, uncrowded association with nature.

   c. Achieve a high standard of management of one of the finest, most extensive hardwood ecosystems in the world.

3. Ability to meet project objectives

   a. To develop a logical extension of the existing Highland Scenic Highway as a significant recreation facility, providing an opportunity for the traveling public to view outstanding scenery over a driving distance of sufficient length to constitute a day's outing.

   b. To provide a variety of quality outdoor experiences for rural and urban dwellers with emphasis on restful, uncrowded association with nature while driving over an attractive, low-speed route, free from distraction of heavy commercial traffic.

   c. To protect and enhance the quality of air, water, soil and natural beauty, including nonreplaceable natural, historic and archaeologic features.

   d. Contribute to local and regional economics by expanding tourism opportunities.

   e. To provide public access for recreational opportunities without excessive disturbance to the environment, with emphasis on dispersed recreation supported by developed recreation sites as needed.

4. Compatibility with the Land Management Plan of the Monongahela National Forest, and with the Shavers Fork Unit Plan.

5. Ability to contribute to national, regional and local goals and planning.

6. Compatibility with public opinion and agency recommendations.

7. Engineering feasibility, including impacts related to suitability for scenic highway purposes, project costs and soils and geology.

8. Economic feasibility.

9. Effects on local and regional socio-economic characteristics, including land use consideration.

10. Compatibility with National Radio Astronomy Observatory Operations.

11. Environmental impacts and the degree of their significance in the areas of:

    a. Water quality
    b. Wildlife and fisheries resources
    c. Coal and timber resources
    d. Grazing
    e. Historic, cultural and archeological resources
    f. Climate and air quality

12. Energy use and consumption.

13. Ability to provide maximum experience of, and minimum damage to, visual resouces.

14. Projections of numbers of users, particularly in the areas of tourism and recreational use.

15. Legality; compliance with Public Law 93-87, Section 161, and other Federal, State and local legislation, regulations and policies.

The sources for the evaluation criteria are indicated as follows:

CRITERIA NUMBER	CRITERIA SOURCE
1.	National Forest objectives: "A Recommended Renewable Resources Program - 1980 Update" USDA Forest Service, September, 1980.
2.	Management priorities for Appalachian National Forests: "Guide for Managing the National Forests in the Appalachians" FSH 2123, Eastern and Southern Regions, USDA Forest Service, January 1, 1973.
3.	Project objectives: Developed by Monongahela National Forest personnel on the basis of historical background, legislation and regulations, and Forest Service policies.
4.	Final Environmental Impact Statement and Land Management Plan for the Monongahela National Forest - Approved January 12, 1978. Final Sub-Unit Plan - Upper Shavers Fork Unit 1980.
5 - 15.	These criteria were developed by Monongahela National Forest personnel on the same basis as #3.

ALTERNATIVES CONSIDERED

SECTION IV

IV. ALTERNATIVES CONSIDERED

There are four alternatives proposed for the construction of the extension of the Highland Scenic Highway, the "build" alternatives (Figure 3). The "no-action" alternative, or the consequences of not constructing the extension of the Highland Scenic Highway, has also been considered in this study.

A. FORMULATION OF ALTERNATIVES

The formulation, refinement and evaluation of the proposed alternatives has been carried out through a process which ensures the consideration of all feasibile alternatives for the proposed highway extension. The process for limiting, refining and evaluating these alternatives is indicated on Figure 18.

Public and other agency participation has been an important element in the formulation and development of the alternatives. This involvement has occurred through correspondence and consultation with individuals, groups and agencies, public informational meetings and interaction with specially-formed public participation working groups. After the draft environmental impact statement is circulated in accordance with mandatory requirements, the U. S. Forest Service will present the opportunity to conduct a formal public hearing if requested by agencies or the public for the study. The public hearing will provide the opportunity for further comment on the contents of the draft environmental impact statement before a decision with regard to the extension of the Highland Scenic Highway is made and a final environmental impact statement is processed.

1. Criteria for Limiting the Study Area and Range of Alternatives

Criteria for limiting the study area and range of alternatives were derived from the actual language and interpretation of the legislation which authorized the extension of the Highland Scenic Highway. One criterion, not derived from the legislation, relates to the concern of possible interference to the operations of the National Radio Astronomy Observatory (NRAO) at Green Bank. After discussions with NRAO personnel and analysis of the effects of vehicular ingnition system inteference on radio astronomy, this criterion has been included because of the extreme sensitivity of this effect on work performed at the observatory and the importance of this work.

After thorough review of the enabling legislation and public and other agency comments received during the study, the following criteria have been developed for the establishment of alternatives for the extension of the Highland Scenic Highway:

<u>Location</u>: Must be within or near the Monongahela National Forest.

<u>Location</u>: Must be within or near the Shavers Fork watershed.

<u>Location</u>: Must proceed from intersection of completed portion of the Highland Scenic Highway with U.S. Route 219, generally in a northward direction to U.S. Route 250 near Barton Knob.

Characteristics: Must have similar characteristics to Shavers Fork watershed.

Type of Traffic: Must be limited to scenic and recreational use and passenger car travel.

Interference with NRAO: Must not significantly interfere with National Radio Astronomy Observatory operations.

Management: Must be able to manage and protect the roadway corridor as a scenic corridor.

2. Delineation of Study Area

The initial action undertaken to identify alternatives was to use the criteria developed for the study to delineate a study area in which they would be located. The study area is bordered by U.S. Route 219, U.S. Route 250 and the Back Allegheny Mountain ridge as shown on Figure 8. The rationale for the delineation of this study area is based on the following considerations:

a. The authorizing legislation establishes the northern and southern boundaries as U.S. Route 250 near Barton Knob and U.S. Route 219 (at the intersection with the completed portion of the Highland Scenic Highway) respectively.

b. The western boundary can also be considered to be fixed by the authorizing legislation which states the scenic corridor forest management unit is to be managed by the U.S. Forest Service. Since lands west of U.S. Route 219, north of Valley Head, are outside of the Monongahela National Forest and the jurisdiction of the U.S. Forest Service, U.S. Route 219 forms the logical western boundary. It would be necessary to provide additional right-of-way for the highway west of U.S. Route 219 by the establishment of purchase units.

c. The ridge of Back Allegheny Mountain forms the eastern boundary of the study area since alternatives east of it would have a severe impact (interference from vehicular ignition ststems) on operations at the National Radio Astronomy Observatory.

3. Application of Criteria to Establishment of Proposed Alternatives

Within the identified study area, alternatives for the proposed extension of the Highland Scenic Highway were developed. The 1979 Federal Highway Administration (FHWA) Corridor Study Report[59] identified four alternatives which formed the nucleus of the present effort to identify alternatives. These four alternatives included one along the Cheat Mountain ridge, one along the ridge of Back Allegheny Mountain, one which follows along Shavers Fork, and one which enters the upper Shavers Fork watershed but then follows the Cheat Mountain ridge to U.S. Route 250 at Cromer Top. Figure 3 shows the location of these alternatives (Alternatives 1-4) which were divided into segments (A-H) by FHWA.

Existing U.S. Route 219 was also considered as a possible alternative in the FHWA Corridor Study (identified as Alternative 5). The FHWA report, however, indicated that this alternative would not improve access to the Monongahela National Forest nor accomplish the goals established by the enabling legislation. This considered alternative would have been very disruptive to all existing development along U.S. Route 219, requiring substantial additional right-of-way and would directly affect a number of homes. The existing alignment of U.S. Route 219 would require improvement at a number of locations where substandard conditions exist. Many of the existing drainage structures and bridges would have to be replaced or reconstructed.

Of primary importance, however, existing U.S. Route 219 would not provide a corridor with scenic qualities which existed on the other alternatives considered. Significantly, it would be almost impossible to restrict existing U.S. Route 219 to the use of passenger cars only, as mandated for the Highland Scenic Highway by the authorizing legislation.

When the U.S. Forest Service reviewed the original FHWA Corridor Study Report, it concurred with the finding that the corridor of U.S. Route 219 was not a viable alternative for the Highland Scenic Highway because of the reasons stated in the Study Report. On this basis, this alternative is not included in the current study as a "build" alternative. U.S. Route 219 is, however, important to the consideration of the "no-build" alternative, which will be subsequently discussed in detail in this environmental impact statement.

During the course of the current study, several other alternatives and modifications of alternatives were investigated (Figure 19). These included a connection of the proposed Cheat Mountain alternative which extends north from the existing intersection with U.S. Route 219 and passes to the west of Mace Knob to a terminus on U.S. Route 219 northwest of Mace Knob (identified as Alternative 6A). This alternative provided a substantial extension of the Highland Scenic Highway and had a convenient northern terminus with an existing road with logical access to the regional highway network. The termination of the Highland Scenic Highway at this point, however, included many of the unfavorable aspects associated with the proposal to utilize the entire U.S. Route 219 corridor. This alternative does not comply with several of the criteria established for the study. Significantly, it did not extend to U.S. Route 250 and was not in or near the Shavers Fork watershed.

In consideration of the failure of this proposed alternative to fulfill the criteria for the location of the alternatives, further study was made to extend alternative alignments in this general area northward to U.S. Route 250. These alternatives were essentially in corridors between the ridge of Cheat Mountain and U.S. Route 219, generally within the Tygart Valley River watershed. These alternatives were also eliminated from study, since they had many similarities to the unfavorable aspects of the corridor along existing U.S. Route 219, were not considered to have the scenic qualities of the other proposed alternatives, and, specifically, were not in or near the Shavers Fork watershed.

Modifications of the Back Allegheny Mountain alternative (Alternative 3) were also investigated in compliance with the criterion to minimize interference at the National Radio Astronomy Observatory. The intent of these modifications was to locate the corridor for the proposed Highland Scenic Highway lower on the western slope of Back Allegheny Mountain to permit the terrain to shield the observatory from the effects of vehicular ignition interference on the highway. None of these modifications appeared to satisfactorily mask the effects of vehicular ignition interference on the operations at the observatory. Of significance to the study and the analysis of the alternatives, the modifications along Back Allegheny Mountain had the characteristics of either the Back Allegheny Mountain alternative (Alternative 3) or the Shavers Fork alternative (Alternative 4). The application of the criteria to these modifications also indicated the same effects as Alternatives 3 and 4. As a measure to simplify the study, these modifications were not developed further for the current study because they were so similar to either of the adjacent alternatives already proposed. If either Alternative 3 or 4 are selected for the proposed highway extension, studies in greater depth will be required in subsequent project implementation stages to minimize the vehicular ignition interference problem on operations of the NRAO.

Table 34 summarizes the consistence of the initially investigated alternatives with the criteria established for the study.

4. Selection of the Four Proposed Alternatives

The process of identifying and limiting possible alternatives for the extension of the Highland Scenic Highway completed an initial phase of the overall study. During this process, the study area was fully defined and described and analyzed with respect to its environmental, social and economic context. Six possible "build" alternatives were identified in addition to possible modifications of these alternatives. This range of alternatives was then limited by applying the criteria derived from the legislation authorizing the study, and as defined during the scoping process to determine issues, concerns and opportunities for the extension of the highway. As a result of the initial analysis for the application of the criteria, two of the six alternatives identified in Table 34 have been eliminated from further study.

The remaining four "build" alternatives are further defined in the supporting document describing the alternatives to be included in this environmental impact statement.[60] These alternatives along with the "no-build" alternative constitute the group of alternatives which have been analyzed and evaluated in subsequent phases of the study and presented in this Draft Environmental Impact Statement. These are identified as:

Alternative 1 - Cheat Mountain-Shavers Fork
Alternative 2 - Cheat Mountain
Alternative 3 - Back Allegheny Mountain
Alternative 4 - Shavers Fork

TABLE 34

CONSISTENCY OF ALTERNATIVES WITH ESTABLISHED CRITERIA

	Shavers Fork - Cheat Mountain	Cheat Mountain	Back Allegheny Mountain	Shavers Fork	U.S. 219	Between Cheat Mountain and U.S. 219	
Criteria	Alt.1	Alt.2	Alt.3	Alt.4	Alt.5	Alt.6A	Alt.6B
1. Location: Within MNF	●	●	●	●	●	●	●
2. Location: In (or near) Shavers Fork Watershed	●	●	●	●	◒	◒	◓
3. Location: North from U.S. 219/HSH intersection to U.S. 250	●	●	●	●	●	○	●
4. Characteristics: Similar to Shavers Fork	●	●	●	●	○	◒	◒
5. Type Traffic: Scenic & Recreational; Passenger Cars Only	●	●	●	●	○	●	●
6. No Interference with NRAO	◒	◒	◒	◒	●	●	●
7. Management: Manage & Protect as Scenic Corridor	●	●	●	●	○	●	●

● VERY CONSISTENT ○ INCONSISTENT

B. DESCRIPTION OF BUILD ALTERNATIVES

The four proposed alternatives have been divided into eight (8) segments (A-H) for detailed description. These segments are basically consistent with the original segments identified in the FHWA Corridor Study Report. The four alternatives have undergone a number of location refinements during the current study. The final proposed alternatives for the extension are summarized as follows:

ALTERNATIVE	DESIGNATION	SEGMENTS	LENGTH
1	Cheat Mt.-Shavers Fork	A, B, G, C	38.91 miles
2	Cheat Mountain	A, D, C	35.20 miles
3	Back Allegheny Mountain	A, B, E, H	39.84 miles
4	Shavers Fork	A, B, E, F	34.78 miles

1. Design Criteria

The design criteria were recommended by Region 15 of the FHWA in its Corridor Study Report. Some of these design criteria have been modified in certain instances in the current study to reduce or eliminate excessive landscape alterations. The modifications include lowering the design speed to 30 mph with a corresponding maximum degree of horizontal curvature increased to 23.0°. The design criteria are utilized for the proposed alternatives listed on Table 35. A typical cross-section for the proposed roadway is shown on Figure 4C.

2. Location Refinement Methodology

U.S. Geological Survey topographic maps, enlarged from a 1"=2,000' scale to a 1"=500' scale and printed on mylar base material were used as the basic study maps for the presentation of the alternatives. Utilizing the design criteria, the alternatives were refined and plotted on this mapping. These alternatives were further refined during the course of their development in response to comments resulting from reviews of earlier versions of the alternatives. When the constraints of this methodology are considered, it is apparent precise locations of the alternatives cannot be exactly established. The methodology used, however, is thoroughly adequate for comparative analysis of the proposed alternatives, serving as a basis for the determination of preliminary earthwork, construction materials and cost estimates. This mapping is also at an adequate scale for many of the related visual management, recreational development planning and environmental studies. Ultimate refinements for a selected alignment will be made during the final design phase.

3. Major Engineering Features

Detailed descriptions, including plans and profiles, of the engineering features of each of the four alternatives proposed for the construction of the Highland Scenic Highway have been included in the supporting document which describes engineering, construction, land acquisition, visual management and recreational development planning programs prepared for this study.[60] A summary of major engineering features and estimated costs for engineering, earthwork and roadway, drainage and structure construction costs are included on Table 36. The summary provides comparisons of roadway lengths, curvature, grades and excavation volumes as well as the estimated costs for all engineering and construction needed for each proposed alternative.

TABLE 35

RECOMMENDED DESIGN CRITERIA

1.	Design Speed	40 mph (30 mph minimum)*
2.	Design Vehicle	Bus
3.	Stopping Sight Distance	
	a. Desirable	300 ft.
	b. Minimum	275 ft.
4.	Number of Lanes	2 (1 each direction)
5.	Lane Width	12 ft. (11 ft. minimum)
6.	Minimum Passing Sight Distance	1,500 ft.
7.	Horizontal Alignment	
	a. Maximum Degree of Curve	12.5 (40 mph) & 23.0 (30 mph)*
	b. Minimum Length of Curve	L + 50 ft.
	c. Maximum Superelevation	0.08 ft./ft.
	d. Minimum Tangent Length Between Curves in Opposite Direction	$\frac{L1 + L2}{2}$
	e. Minimum Superelevation Transition	Min. Length of Runoff for spiral curve
	L, L1, and L2 are minimum length of superelevation transitions. Spiral curves were not used in this study, but will be added to the final alignment.	
8.	Vertical Alignment	
	a. Maximum Grade	8% (9% for less than 500 ft.)
	b. Vertical Curve Length	
	1. Crest	Desirable A x 65 ft. Minimum A x 55 ft.
	2. Sag	Desirable A x 60 ft. Minimum A x 55 ft.
	A is the algebraic difference of the two intersecting grade lines.	
9.	Horizontal Clearance (Minimum)	
	a. Edge of Pavement to Obstruction	8 ft.
	b. Edge of Lane to Bridge Rail	8 ft.
10.	Vertical Clearance (Minimum)	
	a. Scenic Highway	14.5 ft.
	b. Cross Road	14.5 ft.
	c. Railroad	23.0 ft.

*30 mph design speed and 23.0 maximum degree of horizontal curvature utilized in places to avoid excessive landscape alteration.

TABLE 36

SUMMARY OF MAJOR ENGINEERING FEATURES FOR SELECTED ALTERNATIVES

DESCRIPTION		ALTERNATIVES			
		1	2	3	4
		CHEAT MT.-SHAVERS FORK	CHEAT MT.	BACK ALLEG. MT.	SHAVERS FORK
LENGTH	L.F.	205,450	185,850	210,380	183,630
	MILES	38.91	35.20	39.84	34.78
PERCENT OF HORIZONTAL CURVATURE	0°00'-4°00'	33	30	35	34
	4°30'-8°00'	30	28	31	33
	8°30'-12°30'	24	31	22	20
	13°00'-23°00'	13	11	12	13
LENGTH OF GRADES IN MILES	UNDER 4%	26.04 (67%)	22.93 (65%)	22.99 (58%)	26.83 (77%)
	4% - 8%	12.47 (32%)	11.55 (33%)	16.33 (41%)	7.55 (22%)
	OVER 8%	0.40 (1%)	0.72 (2%)	0.52 (1%)	0.40 (1%)
COST OF MAJOR DRAINAGE STRUCTURES		$ 320,000	$ 223,000	$ 228,000	$ 552,000
NUMBER OF GRADE - SEPARATION STRUCTURES		1	1	0	1
COST OF GRADE - SEPARATION STRUCTURES		$ 960,000	$ 960,000	0	$ 1,280,000
QUANTITY OF EXCAVATION (C.Y.)		4,701,900	4,667,000	3,248,200	3,017,200
ESTIMATED CONSTRUCTION COST (INC. STRUCTURES)		$ 38,265,000	$ 35,474,000	$ 33,841,000	$ 32,068,000
ENGINEERING & CONTINGENCY COSTS (10%)		$ 3,826,000	$ 3,547,000	$ 3,384,000	$ 3,207,000
TOTAL CONSTRUCTION & ENGINEERING COSTS		$ 42,091,000	$ 39,021,000	$ 37,225,000	$ 35,275,000

4. Management Programs

Each of the four alternatives proposed for the extension of the Highland Scenic Highway can be constructed in accordance with the engineering design criteria established for these alternatives. Each of these alternatives is also feasible within the physical constraints imposed by the study area from the engineering point of view. The ability of each alternative to conform to the National Forest management objectives for the area is, however, of major importance in the selection of the alternative to be recommended for construction.

A major objective for the study area is the acquisition of lands and mineral interests, now privately-owned, by the Federal government for a scenic corridor forest management unit, extending into the Upper Shavers Fork area, with the scenic highway as an integral part of the unit. Land acquisition programs have been established for each alternative. These land acquisition proposals were based primarily on measures to preserve and enhance the scenic quality of the area as viewed from each of the proposed highway alternatives. Consideration of other factors are, however, necessary in fully determining the land acquisitions for each proposed alternative. The other factors considered include recreational development planning, reclamation programs and the preservation of the water quality of the area's waterways, especially Shavers Fork.

Each alternative thus includes associated acquisition and recreational development management programs as integral components. The four alternatives and their management programs are shown on Figures 20A through 20M.

a. Acquisition Programs

The Federal Aid Highway Act of 1973, which authorizes the Highland Highway, stipulates in Section 161(h) that "Construction shall not be initiated within the Upper Shavers Fork watershed until the Forest Service has acquired sufficient lands and interests in lands (including mineral rights) in such watershed to assure an adequate scenic corridor for the Highland Scenic Highway and control of water quality in Shavers Fork." These acquisition programs are recommended as the minimum needed to meet the goals established by the authorizing legislation. Quantity of land (in acres) (See Table 44) included in the acquisition program for each alternative are:

Alternative 1 = 36,778 acres	Alternative 3 = 50,254 acres
Alternative 2 = 37,247 acres	Alternative 4 = 41,017 acres

(1) Land Acquisition Criteria

The criteria for acquisition of lands and interests in lands have been developed which relate to the construction of each of the proposed alternatives and to the recreation and visual management goals and objectives defined in the 1973 Federal Aid Highway Act. The criteria has also been refined during the coordination and consultation process which was an integral part of the development of the alternatives. Table 37 summarizes these criteria.

TABLE 37

ACQUISITION CRITERIA

Purpose	Type Acquisition	Standard
I. Construction of Highway, Recreation Areas, Interpretive Trails, and Control of Visual Quality	Fee (Surface & Minerals)	A. Lands within 500 feet each side of centerline of highway.
		B. Lands within 50 feet each side of centerline of interpretive trails.
II. Rehabilitation for Improvement to Visual Quality	Fee (Surface & Minerals)	A. Lands that are outside of the corridor defined in I.A. but that are not beyond the limit of the middleground (3-5 miles)*, and that
		B. Are immediately and obviously visible to the moving motorist or from an overlook, and
		C. Require rehabilitation* and are not going to be adequately rehabilitated by others.
III. Visual Quality Maintenance	Easement	A. See II. A.
		B. See II. B.
		C. Are either of the 'A' Variety Class*, or are critical components of the viewed area, except
		D. When the area so defined has been minimized and located close to the highway because it includes lands that would be difficult or very costly to control visually, because:
		1. Of existing or potential development; e.g. along U.S. Route 219, or
		2. At certain overlooks where the vista encompasses an expansive area that extends well beyond the middleground*, making visual control of the entire area infeasible.

*U.S. Forest Service Visual Management System Terminology

(2) Lands for Construction Right-of-Way of Highways and Recreation Areas

For the construction of any of the build alternatives, a 1,000 foot band, 500 feet each side of the centerline, should be acquired in fee for both surface and mineral rights. The 1,000 foot right-of-way is wide enough to accommodate the most extensive cuts and fills required for the roadway and will accommodate construction of the recreation areas identified as essential for the recreational development programs. Lands within 50 feet of the centerline of interpretive trails should also be acquired in fee.

The 1,000 foot corridor also facilitates the achievement of the visual quality objectives in the area by providing an adequate area for complete visual control of the foreground and for indirect visual control of the middleground and background. Indirect control over the area which can be seen can be exercised by altering the height of vegetation and its distance from the road or recreation area. Indirectly, selective control of the adjacent vegetation can expose, highlight, or buffer views.

(3) Lands Requiring Rehabilitation/Reclamation

Outside of the 1,000 foot band providing the right-of-way and within an area immediately and obviously visible to the moving motorist or from overlooks, some strip-mined areas, specifically near White Top, have not been adequately rehabilitated by the present owner or leaseholder. Currently, regulations of the Office of Surface Mining, U. S. Department of the Interior, require adequate restoration of strip-mined areas. These lands must be restored to their original contours and planted to avoid erosion. The surface mining at White Top was done before the current regulations came into being and these areas are not subject to the requirements for restoration to the current standards. To assure rehabilitation of this area to a compatible visual quality with adjacent areas, it is recommended that the Forest Service acquire these land, as appropriate for each alternative, in fee and provide for their reclamation as a part of the project to extend the Highland Scenic Highway. These surfaced mined areas are recommended for fee acquisition because of the extent of reclamation work, grading and planting which is necessary. The purchase of easements, for the complete reclamation of the mined areas is considered to be as expensive as fee acquisitions and it is unlikely reclamation under an agreement for an easement would accomplish as expeditiously as it would if the Forest Service acquired the land in fee and reclaimed it. The proposed rehabilitation areas for each alternative are delineated on Figure 20 with an "r".

(4) Other Lands Visible from Highway and Overlooks

Scenic easements are proposed for land outside of the 1,000 foot construction right-of-way and for which fee acquisition has not been proposed to aid in reclamation. These lands are normally within the middleground (3-5 miles) as defined by U.S. Forest Service Visual Management Systems definitions.[62] These lands, which are indicated on the drawings in Figure 20, are immediately and obviously visible to the moving motorist and from overlooks. These lands are of the "A" variety class as defined by

U.S. Forest Service definitions,[62] or are critical components of the viewed area. Acquisition of land by scenic easements assures the goals for the highway and visual quality objectives are achieved at a cost considerably less than that for fee acquisition. These costs are estimated to be 75-90% of costs for fee acquisition.

The objective of the easement program is to acquire the "development rights" of the land while allowing it to remain in private ownership. Easement control would essentially maintain the aesthetic qualities that now exist. Since ownership of all land rights are not needed to maintain these qualities, only specific rights would be included in the easement.

(5) Exceptions

There were exceptions to the criteria in the delineation of the acquisition programs for the alternatives shown in Figure 20. Lands that would be difficult or very costly to control visually were not included in the easement areas. These exceptions include some lands along U. S. Route 219 where there are existing or potential development areas. Areas viewed from certain overlooks provide expansive panoramas that extend well beyond the middleground, rendering visual management control of the entire area infeasible. These areas have also been considered as exceptions and, in these cases, the easement areas have been minimized and located close to the highway.

(6) Determination of Visual Quality Objectives

The National Forest Landscape Management System[62] has been applied as an aid in determining management guidance for lands within the scenic easements. Using this procedure, areas identified with a sensitivity level of "1", in the foreground and middleground distance zones, and A and B landscape variety classes yield retention, "R", and partial retention, "PR", visual quality objectives. Areas identified within these visual quality objectives are indicated on Figure 20. The retention objective provides for management activities which are not visually evident, while the partial retention provides for those activities that remain visually subordinate to the characteristic landscape.[62] These activities are further defined in Table 38. Although easement areas would set limitations on some activities, additional ones would become available. The overall compatability of acquired lands and interests, with the scenic highway, would be consistent with the Monongahela National Forest multiple use concept.

b. Recreational Development Planning Program

The initial actions in the formulation of the recreational development planning program consisted of identifying potential recreational activity needs that would be associated with the proposed highway and inventorying potential scenic overlooks, picnic areas, trails, and campgrounds. The initial effort to develop recreational plans consisted, first, of locating areas which were environmentally suitable for the potential development of various recreational activities; and, second, preparing potential future recreational opportunities plan for each proposed alternative. Originally, two future recreational

TABLE 38

CONTENT OF SCENIC EASEMENTS
UTILIZING THE LANDSCAPE MANAGEMENT SYSTEM

Composite Criteria	Visual Quality Objective	Definition/Permitted Activities
fg 1A, fg 1B, mg 1A	Retention (R)	Provides for management activities which are not visually evident. Management activities should be accomplished either during or immediately after construction. Management methods include seeding, hand planting of large trees, painting, etc. Permitted activities include: Logging - if tree removal clearings are not evident Ski Slopes - if planted to conform to color, line, texture of surrounding area. Roads - if limited in width and following natural contours so as not to be visually evident from scenic highway. Mining - deep mines, if successfully camouflaged. Trails - Other - any activity which would not produce landscape changes visually evident from scenic highway.
mg 1B	Partial Retention (PR)	Provides for management activities which remain visually subordinate to the characteristic landscape. Management activities should be accomplished within one year after construction. Permitted activities include: Logging - if irregularly shaped clear cuts. Mining - deep mines only Ski Slopes - Roads - Trails - Structures - buildings, towers, dams, parking lots, etc. as long as design repeats form, color, or texture common to character of landscape.

opportunity plans were developed for each highway alternative - a high intensity plan and a low intensity plan. The difference between the two intensity levels is the number, size and type of activities proposed in each plan.

The coordination and consultation process that has been ongoing throughout the course of the study, together with futher recreational demand analysis, revealed that the opportunities presented in these original concepts, even the low intensity plans, were much more extensive than those initially needed for user enjoyment of the highway. From this original effort, the recreational opportunities essential to the user's enjoyment of the highway were selected and modified for presentation with the appropriate highway alternative. These essential elements are described in the following discussions and are shown on Figure 20. The actual recreation developments to be provided with the selected alternative would be located and designed for consistency with the Recreation Opportunity Spectrum (ROS) classes which will be determined for the various portions of the proposed highway when the Forest Land and Resource Management Plan is completed (See Section V.B.1.).

There are numerous natural and man-made elements throughout the study area offering excellent opportunities for scenic vistas and interpretive planning facilities. A set of recreational opportunities has been provided for each proposed alternative which makes many points of interest visually accessible. The development of the proposed recreation programs has been focused on those activities considered to be necessary for user enjoyment of the highway. Information on several other scenic roadways with characteristics similar to the Highland Scenic Highway was collected and analyzed to aid in determining the appropriate types, sizes and locations of recreational facilities for the alternatives. This information is shown in Table 39.

The activities included in the proposed recreation programs are scenic overlooks, picnic areas, interpretive trails and an optional bikeway. Prototypical designs of these facilities are shown in Figures 21-23. Investigations into the demand for campground development, as a necessary element for user enjoyment of the highway, indicated that campground development was not justified as essential. Development of campgrounds had been considered during the development of the original recreational development plans and remains a recommended objective for future land utilization in the study area. It is considered, however, that the development of campgrounds may be more effectively accomplished by the State of West Virginia or private means. The investigations previously undertaken relating to potential campground locations may provide guidance to further development of the area and is available through the Forest Service.

(1) Scenic Overlooks

Natural features such as the knobs along Cheat and Back Allegheny Mountains; the rich vegetation including the red spruce stands not seen in many other places in the eastern United States; and the headwaters of Shavers Fork present the viewer with a graphic impression of the scenic grandeur of the area. Man's influence through his utilization of this environment also can be readily identified. Indications of past timber harvesting and mining activities, recreational development, locations of historic significance and other uses of the forest land are apparent throughout the study area.

TABLE 39

SELECTED RECREATION INFORMATION - SCENIC HIGHWAYS

	Richard B. Russell Scenic Highway	Talladega Scenic Drive	Talimena Scenic Drive	Tellico Plains Robbinsville Rd	Blue Ridge Parkway	Skyline Drive
Location	Chattahoochee NF Georgia	Talladega NF Alabama	Ouachita NF Ark/Okla	Cherokee NF Tenn/N.C.	VA/N.C.	Shenandoah NP Virginia
Length	18 miles (15 mi. in NF)	20 mi. built 70-74 miles planned	54 miles	20 mi. open(Tenn) 17 " planned(NC)	469 miles	105 miles
Overlooks						
Total number	8-10	6-7	18 now (22-23 ultim.)	6	16 major	70 +
Ratio to mileage	1:2 mi.	1:3 mi.	1:3 - 1:2.4 mi.	1:3.3 mi.		1:1.5 mi.
Parking capacity	1 large(30-40) Others 8-10	6-10		5 cars at 3 10 cars at 3		5-10 for most; a few much larger
Picnic Areas	None	None (State Park nearby)	2(1-26 units; 1-5 units) 1 more planned	None 1 planned (6-8 units; 10 car parking)	15 plus sites at campgrounds	8 (20-50 units each)
Campgrounds	None	None	1 (26 units)	1 (125 units; expansion planned)	9 (plus 3 lodges)	3 large; 2 small
Hiking Trail	Appalachian Trail 1 mile trail to falls	1 - parallel to scenic drive	3 interpretive trails	1 to scenic area		400 miles

The locations of the proposed scenic overlooks have been sited to take advantage of the visual quality and interpretive opportunities relative to each of the proposed alternatives. A number of scenic overlooks have been provided along the completed adjacent section of the Highland Scenic Highway with more in the planning stage. These existing scenic overlooks are listed below with their distances from the intersection with U. S. Route 219 - the point at which the proposed portion of the highway meets the completed section:

Facility	Distance from U.S. Route 219
Red Lick Overlook	2.5 mi.
Little Laurel Overlook	5.5 mi.
Little Spruce Overlook	14.0 mi.
Big Spruce Overlook	16.5 mi.
Cranberry Glades Overlook	18.0 mi.

The number of scenic overlooks along the proposed alternatives for the extension of the Highland Scenic Highway range from 11 to 15, with distances between scenic overlooks averaging between 3.1 to 2.6 miles. This distribution and spacing is consistent with that existing and proposed along the completed section. These ranges also correspond positively to the other scenic highways investigated as shown in Table 39.

A typical scenic overlook, as shown in the Prototypical Design in Figures 21 and 22, includes parking for 10 to 15 automobiles and 2 to 3 recreation vehicles. Viewing orientation and overlook siting depends on the particular vantage point for the scene viewed. Viewing areas may be oriented directly toward the desired view; or if increased elevation is required and available, a reverse orientation may be used with the viewing area sited to look back over the roadway to achieve the desired view. Each scenic overlook includes a concrete walk and curb, information kiosk or signage, benches and trash receptacles. Wooden barriers, or fencing, approximately two feet in height, would be provided as needed for protection along steep slopes or at other locations where entry should be discouraged. The facilities at the scenic overlooks would be designed to permit their use by the handicapped.

(2) Picnic Areas

Based on the number of people anticipated to use the extension of the Highland Scenic Highway, it is recommended that picnic areas be incorporated into the construction of the highway. There is a picnic area located at the Red Lick Overlook, 2.5 miles from U. S. Route 219 along the completed adjacent section of the scenic highway. The investigations into the frequency of picnic areas of other scenic highways indicate that one picnic area is provided approximately every 20 miles (see Table 39) which has been established as a standard.

Two or three picnic areas, each combined with a scenic overlook area, have been included for each of the proposed alternatives. Prototypical design is shown in Figure 23. The proposed picnic areas provide

parking for five to ten automobiles and two or three recreation vehicles, 10 to 15 picnic sites, located in cleared and grubbed areas, each having a picnic table, upright barbecue pit, and trash receptacle. A restroom facility is proposed at each picnic area with water available as well.

(3) Interpretive Trails

Interpretive planning in the National Forest has the major goal of increasing the awareness of visitors through orientation and interpretation of natural and cultural history, and the principles of management related to natural resources. Interpretive facilities can be located at areas viewed by motorists, or they can be designed to be accessible by foot. Although the scenic overlooks proposed with each of the alternatives are actually interpretive facilities, additional unique opportunities to enrich the educational experience can be provided by the creation of interpretive trails. Numerous interpretive facilities have already been designed and constructed throughout the Monongahela National Forest. These facilities include:

Existing Facilities

Cranberry Mountain Visitor Center
Seneca Rock Visitor Center
Gaudineer Scenic Area Trail
Cranberry Glades Walk
Plant Kingdom Trail
Beaver's Tail Braille Trail
Whispering Spruce Trail
Northland Loop Trail
Gatewood Resource Management Trail
Seneca Interpretive Trail
Allegheny Historical Cabin

A number of potential interpretive themes or focal points have been identified as opportunities for the design of interpretive trails as part of the study. These have been selected as natural or manmade elements which may heighten the visual experience of the Forest visitor:

Natural Elements

Shavers Fork
High Elevation Spruce Stands
Saddle at Thorny Flat
Back Allegheny Mountain
Various Knobs and Terrain Features

Manmade Elements

Strip Mining Activity
Timbering Practices
Town of Spruce
Cass Scenic Railroad
Western Maryland Railroad - Major RR Cut
Snowshoe Resort

Each of these interpretive elements can be made accessible from one or more of the proposed highway alternatives. The trail locations originate at scenic overlooks to facilitate cost effectiveness and ease of construction. A typical trail may be approximately five feet wide,

cleared and grubbed, with interpretive signage and benches at strategic locations. The trails associated with the proposed alternatives range, in length, from one to six miles. Many of the interpretive trails can be located on existing trails, or other easily accessible grades. Portions of the trails with easily accessible grades can be improved and surfaced adequately for use by wheelchairs and other people with mobility restrictions.

(4) Bikeway

As part of the overall recreational planning effort, the incorporation of a biking lane would be evaluated for pros and cons. The bikeway's anticipated use, proposed design criteria, relationship to other facilities, anticipated effects on excavation, environmental impacts, and costs would be evaluated before a final decision is made to include it. The proposed biking lane can be located adjacent to the roadway and should be approximately ten feet wide. Prototypical designs for the proposed biking lane are included in Figure 23. The bikeway would provide for two-directional travel.

(5) Summary of Recreational Development Programs

A proposed recreational development planning program has been prepared for each of the proposed alternatives. The recreational sites selected for each alternative are identified by type on Tables 40 through 43 with comments discussing their interpretive significance. The locations of the selected recreational sites can be identified on the appropriate drawings included in Figures 20A through 20M.

5. Characteristic Landscapes

The characteristic landscape through which the alternatives extend is defined as the overall impression created by the unique combinations of visual features, including land form, vegetation, water, and man-made elements. These features can be described in terms of four elements (form, line, color, and texture) which compete for dominance in any landscape.[35]

Most of the study area lies just west of the Allegheny front in the Allegheny Plateau Physiographic Province which is highly dissected and forms a panorama of steep, rugged mountains separated by narrow valleys. The drainage pattern is typically dendritic consisting of numerous winding streams.[1] In the northern portion of the study area, the Shavers Fork drainage basin, the landscape is dominated by the Cheat and Back Allegheny Mountain ridges with rounded and knobby mountain caps between these ridges, and the Shavers Fork valley which is narrow and V-shaped. The mountain knobs and ridges dominate the landscape with strong elements of form, while their tops and the Shavers Fork present curvilinear elements. To the east, Back Allegheny Mountain slopes sharply to the Greenbrier River valley. Some cleared areas of agricultural and residential land uses exist near Back Mountain Road which parallels Back Allegheny Mountain about one-half mile to the east of its ridge. These areas provide some pleasing variety in the landscape. To the west, Cheat Mountain slopes gradually into the Tygart River Valley. Some cleared areas of agricultural and residential land uses exist on the lower slopes and provide variety in the landscape.

TABLE 40

RECREATION DEVELOPMENT PLAN

ALTERNATIVE #1 - Cheat Mt./Shavers Fork; Segments A,B,G,C

LOCATION	FACILITIES	INTERPRETIVE ELEMENTS
1	Overlook	Views to Clover Creek, Cloverlick Mt., Chestnut Flat and Moffet Knob.
2	Overlook	Views to Warwick Run, Buzzard Ridge and Bartow Top
3	Overlook	Views to Clover Creek, Gibson Knob, and Cloverlick Mt.
4	Overlook	Views to Big Spring Fork, Tallow Knob, and Cheat Mt.
5	Overlook	Views to Town of Cass, Greenbrier River and beyond. Excellent Long view atop Thorny Flat.
6	Overlook	Views to Snowshoe Resort, Cheat Mt., Thorny Flat, and Shavers Fork Headwaters.
	Picnic	Overlook combined with picnic area.
	Trail	Interpretive trail using old railroad grade to Shavers Fork and/or top of Back Allegheny Mt.
7	Overlook	Views to Shavers Fork, Bald Knob, Spruce Forest, WMRR and Cass RR.
	Trail	Interpretive trail using existing jeep trail to town of Spruce. Possible pick-up for Cass Scenic RR.
8	Overlook	Views to Tygart Valley River, Mace Knob Valley Mt., Historic RR Cut.
9	Overlook	Views to Shavers Fork, Rocky Run, Beech Flat Knob, Spruce Forest, and WMRR.
10	Overlook	Views to Tygart Valley, Valley Mt., Elk Mt., Mingo Knob, Rt. 219, and County Line. Excellent long view.
11	Overlook	Views to Shavers Fork, Beaver Creek, Beech Flat Knob, Spruce Forest, and WMRR
	Trail	Interpretive trail using existing jeep trail to Shavers Fork.
12	Overlook	Views to Conley Run, Tygart Valley Rt. 219, and Spruce Forest.
13	Overlook	Views to Lambert Run, Barton Knob, Spruce Forest and Strip Mine.
	Picnic	Overlook combined with picnic area
	Trail	Interpretive trail using existing roadway and Lambert Run to view Spruce Forest and Strip Mine.

TABLE 41

RECREATION DEVELOPMENT PLAN

ALTERNATIVE # 2 - Cheat Mt., Segments A,D,C

LOCATION	FACILITIES	INTERPREATIVE ELEMENTS
1	Overlook	Views to Clover Creek, Cloverlick Mt., Chestnut Flat and Moffet Knob.
2	Overlook	Views to Warwick Run, Buzzard Ridge and Bartow Top
3	Overlook	Views to Clover Creek, Gibson Knob, and Cloverlick Mt.
4	Overlook	Views to Big Spring Fork, Tallow Knob, Cheat Mt., Thorny Flat, and Spruce Forest.
	Picnic	Overlook combined with picnic area
5	Overlook	Views to Tygart River Valley, Mace Knob, Rt. 219, and WMRR
6	Overlook	Views to Shavers Fork, Spruce Forest, Town of Spruce, WMRR, and Cass RR
	Trail	Interpretive trail using railroad right of way from Historic railroad cut to town of Spruce and Shavers Fork, can continue for pick-up area to Cass Scenic RR
7	Overlook	Views to Shavers Fork, Rocky Run, Beech Flat Knob, Spruce Forest, and WMRR.
8	Overlook	Views to Tygart Valley, Valley Mt., Elk Mt. Mingo Knob, Rt. 219, and County line. Excellent long view.
9	Overlook	Views to Shavers Fork, Beaver Creek, Beech Flat Knob, Spruce Forest and WWRR.
	Picnic	Overlook combined with picnic area.
	Trail	Interpretive trail using existing jeep trail to Shavers Fork
10	Overlook	Views to Conley Run, Tygart Valley Rt. 219, and Spruce Forest.
11	Overlook	Veiws to Lambert Run, Barton Knob, Spruce Forest and Strip Mine.
	Picnic	Overlook combined with picnic area
	Trail	Interpretive trail using existing roadway along Lambert Run to view Spruce Forest and Strip Mine.

TABLE 42

RECREATION DEVELOPMENT PLAN

ALTERNATIVE #3 - Back Allegheny Mt., Segments A,B,E,H

LOCATION	FACILITIES	INTERPRETIVE ELEMENTS
1	Overlook	Views to Clover Creek, Cloverlick Mt., Chestnut Flat and Moffet Knob.
2	Overlook	Views to Warwick Run, Buzzard Ridge and Bartow Top.
3	Overlook	Views to Clover Creek, Gibson Knob, and Cloverlick Mt.
4	Overlook	Views to Big Spring Fork, Tallow Knob, and Cheat Mt.
5	Overlook	Views to Town of Cass, Greenbrier River and beyond. Excellent long views atop Thorny Flat.
6	Overlook	Views to Snowshoe Resort, Cheat Mt., Thorny Flat, and Shavers Fork Headwaters.
	Picnic	Overlook combined with picnic area
	Trail	Interpretive trail using old railroad grade to Shavers Fork and/or top of Back Allegheny Mt.
7	Overlook	Views to Shavers Fork, Beech Flat Knob, Spruce Forest, and WMRR horseshoe curve.
	Trail	Interpretive trail to town of Spruce. Possible pick-up area for Cass Scenic RR
8	Overlook	Views to Shavers Fork, Second Fork, Beech Flat Knob, Hosterman, and Spruce Forest.
	Picnic	Overlook combined with picnic area
	Trail	Interpretive trail atop Back Allegheny Mt. to Overlook #9
9	Overlook	Views to National Radio Astronomy Observatory, Greenbrier River and beyond from atop Back Allegheny Mt. Excellent long views.
10	Overlook	Views to National Radio Astronomy Observatory, Greenbier River and beyond from atop Back Allegheny Mt. at Hosterman. Excellent long views.
11	Overlook	Views to Shavers Fork, First Fork, Spruce Forest and WMRR
12	Overlook	Views to Shavers Fork, First Fork and, Spruce Forest
13	Overlook	Views to Greenbrier River and beyond from atop Back Allegheny Mt. Excellent long views.
	Picnic	Overlook area combined with picnic area
14	Overlook	Views to Fish Hatchery Run, Barton Knob, Spruce Forest; and Active and Reclaimed Strip Mine.
15	Overlook	Views to Fish Hatchery Run, Shavers Fork, Spruce Forest and Strip Mine.
	Trail	Interpretive trail using existing roadway cross Cheat Br. to Reclaimed Strip Mine.

TABLE 43

RECREATION DEVELOPMENT PLAN

ALTERNATIVE #4 - Shavers Fork; Segments A,B,E,F

LOCATION	FACILITIES	INTERPRETIVE ELEMENTS
1	Overlook	Views to Clover Creek, Cloverlick Mt., Chestnut Flat and Moffet Knob.
2	Overlook	Views to Warwick Run, Buzzard Ridge and Bartow Top
3	Overlook	Views to Clover Creek, Gibson Knob, and Cloverlick Mt.
4	Overlook	Views to Big Spring Fork, Tallow Knob, and Cheat Mt.
5	Overlook	Views to Town of Cass, Greenbrier River and beyond. Excellent long views atop Thorny Flat.
6	Overlook	Views to Snowshoe Resort, Cheat Mt., Thorny Flat and Shavers Fork Headwaters.
	Picnic	Overlook combined with picnic area.
	Trail	Interpretive trail using old railroad grade to Shavers Fork and/or top of Back Allegheny Mt.
7	Overlook	Views to Black Run, Shavers Fork, Mace Knob, Cass RR
	Trail	Interpretive trail using existing roadway to Snowshoe Resort. Possible cross country skiing route.
8	Overlook	Views to Shavers Fork, Bald Knob, WMRR horseshoe curve.
	Trail	Interpretive trail to town of Spruce and Historic railroad cut.
9	Overlook	Views to Shavers Fork, Rocky Run, Beech Flat Knob, Spruce Forest, and WMRR.
10	Overlook	Views to Shavers Fork, Ward Knob, Spruce Forest, and WMRR.
11	Overlook	Views to Shavers Fork, First Fork, Spruce Forest, and WMRR
	Picnic	Overlook combined with picnic area.
12	Overlook	Views to Shavers Fork, Lambert Run, Barton Knob, Spruce Forest, and Strip Mine.
	Trail	Interpretive trail using existing roadway along Lambert Run to view Spruce Forest And Strip Mine.

Most of the land area within the Shavers Fork basin is forest covered with deciduous and non-deciduous (spruce) trees. This produces a fairly uniform texture, however, timber harvesting has resulted in disturbances in this uniform texture and, in fact, unacceptable modifications (large clearcut areas) in some cases. The presence of the spruce varies landscape colors and texture in seasons, other than summer. The deciduous trees provide outstanding color to the landscape in the fall months.

Aside from timber harvesting activity, coal mining is another human activity in the Shavers Fork that significantly affects the characteristic landscape. Strip mines, haul road, and loading facilities are all evident, particularly in the northern-most portion of the study area. Strip mines, in particular, has resulted in unacceptable modifications of landscape. The Western Maryland Railroad, another man-made element in the landscape, parallels the Shavers Fork, and adds to the strength of the linear element provided by the stream and coal and timber haul roads along it.

The Showshoe Ski Resort and Cass Scenic Railroad present additional man-made elements in the characteristic landscape within the Shavers Fork drainage basin. The ski slopes, lifts, and railroad present elements of line in the landscape.

South of the Shavers Fork area, the topography is more irregular. Distinctive land forms include Tallow, Gibson and Gay Knobs and Cloverlick Mountain which introduce dominant form elements in the characteristic landscape. The tops of the knobs and ridges and the principal streams, Slaty Fork and Cloverlick Creek, provide curvilinear elements in the landscape.

In this area the higher elevations and steep slopes are forest covered and timber harvesting has occurred less than in the Shavers Fork area. The reduced level of timber harvesting together with the fact that spruce is less prominent than in the Shavers Fork, provides a fairly uniform texture on the higher elevations and steep slopes. The deciduous trees that cover these areas provide brilliant color in the fall landscapes.

Some of the lower elevations, valleys, and areas along roads in this area have been cleared of timber and are in residential, commercial, and agricultural land uses. These cleared areas provide a pleasing variety in the landscape.

Those landscapes dominated by the canopy covered ridges and knobs lack variety and have a relatively low capability to absorb the introduction of a strong linear element such as the scenic highway, even if previously affected by clearcutting or strip mining.

With the highway's construction the linear element would present itself even if every possible effort is made to follow natural contours and to minimize landscape alterations. The adverse linear effect would be particularly apparent in areas with the landform characteristics that are found in landscapes which include Cheat and Back Allegheny Mountains, near Segments C and H of Alternatives 1, 2 and 3.

The scenic highway could be more readily absorbed in landscapes containing more variety and stronger linear elements such as those where the valleys and less steep slopes have been cleared or partially cleared of canopy for agriculture, homes, roads, etc.; and those along river and stream valleys. Such characteristics are found in the landscapes near Segments A, B, D, E, G and F, with at least two of these segments contained in all of the alternatives.

6. Summary of Selected Build Alternatives

As shown in Figure 18, Process for Limiting, Refinining and Evaluating Alternatives, criteria were first developed and applied to limit the study area and the range of possible alternatives. Six possible build alternatives and a no-build alternative were initially identified. Applying the developed criteria, two of the initially considered build alternatives were eliminated from further consideration (see Table 34). These were the U.S. Route 219 alternative and an alternative located between U.S. Route 219 and the ridge of Cheat Mountain. The four remaining alternatives were then refined using the design criteria in Table 35.

Land acquisition programs and recreation development planning programs were then developed for each of the proposed build alternatives. These management programs are the minimum programs needed to meet the goals and objectives established for the proposed extension of the Highland Scenic Highway. The goals and objectives for these alternatives were established ensuring consistency with the authorizing legislation, Public Law 93-87, Section 161.

Costs of land acquisition, engineering, construction and recreation development programs for each of the four proposed build alternatives are discussed in Section V.A.

The environmental impacts of each of the four proposed alternatives and the no-build alternative are documented in Section V - EFFECTS OF IMPLEMENTATION of this environmental impact statement.

C. NO-ACTION ALTERNATIVE

The no-action, or no-build, alternative is presented in this environmental impact statement both as an equally viable alternative and as a technique to evaluate the consequences of not constructing any of the proposed alternatives for the extension of the Highland Scenic Highway from U.S. Route 219 to U.S. Route 250. There are, however, a number of options which can occur within the formulation of the no-build alternative. These options include the termination of the Highland Scenic Highway at the present intersection at U.S. Route 219 with no further highway improvements related to the Highland Scenic Highway to be implemented north of this intersection. This option, however, must be further conditioned to consider effects on local highways, especially U.S. Route 219, because of traffic using these highways as a means of access to the existing scenic highway section. At the other extreme of the range of possible alternatives are considerations of other possible transportation measures which could be provided in lieu of the proposed extension of the scenic highway restricted to passenger cars only. Other options which are appropriate to the no-build alternative include consideration of providing only selected portions of the proposed alternatives which may partially fulfill selected objectives for the project. The consideration of the terminus of the Highland Scenic Highway on U.S. Route 219 northwest of Mace Knob, as previously discussed, represents one type of option which may

be considered within this category of conditioned alternatives. Other options which provide only limited portions of the extension of the Highland Scenic Highway have also been considered in the formulation of the no-build alternatives.

Scheduling or phasing of the construction of the proposed scenic highway extension is an important consideration with respect to the possible conditioned options related to a no-build alternative. Funding for the current study originated from the 1978 DOT Appropriation Act which provided for a study of the Highland Scenic Highway. This study was limited to the extension of this highway from U.S. Route 219 to U.S. Route 250, and included specific reference to the requirements within the upper Shavers Fork area contained in Public Law 93-87. It was also specifically indicated the Highland Scenic Highway was to be designated as a Federal-aid secondary system route to allow highway trust funds to be utilized for this highway. As a consequence, the availability of funding, or the Congressional allocation of funding, for the Highland Scenic Highway will remain a principal factor in the determination of scheduling and phasing of the construction of the extension from U.S. Route 219 to U.S. Route 250.

There has been significant public participation during the course of the study of the extension of the Highland Scenic Highway. Responses from many individuals and groups have indicated opposition to the proposed extension of the Highland Scenic Highway, i.e., supporting the no-build alternative. The reasons for the opposition to the proposed extension have been many, including concerns for preservation of the natural environment, particularly in the upper Shavers Fork area, impact on wildlife and water quality, energy usage and economic concerns. Many of the responses opposing the extension of the Highland Scenic Highway on a new location have suggested the utilization of the U.S. Route 219 corridor for the Highland Scenic Highway. As indicated previously, the U.S. Route 219 corridor has not been included as a build alternative because it does not fulfill the criteria established for the study which has been based largely on the authorizing legislation, Public Law 93-87. The effect of terminating the Highland Scenic Highway at its present intersection will induce impacts on U.S. Route 219, in essence, making these effects considerations under the no-build alternative.

In any event, the no-build alternative has been strongly supported by many respondents during the public participation in the Highland Scenic Highway Study. As a result, the no-build alternative has remained as more than a baseline alternative for the measurement of potential impacts of the alternatives proposed for the extension of the highway. The no-build alternative has been regarded throughout the study as a viable alternative considered equally with the build alternatives as a possible recommended alternative.

The assessments and evaluations of the proposed build alternatives are, however, primarily based on the consideration of the no-build alternative as a no-action alternative, i.e., the Highland Scenic Highway would terminate at its present intersection at U.S. Route 219 and no further action would be taken to extend the scenic highway to the north. This definition of the no-build alternative, however, requires consideration of the effects traffic would have on using other local roads as access to the completed section of the Highland Scenic Highway. There would also be social and economic impacts associated with this consideration of the no-build alternative.

Normally, consideration of other transportation measures which would fulfill the objectives intended for the project are thoroughly explored during studies of this nature. In this particular case, measures involving mass transportation or fixed rail systems are generally regarded as inappropriate solutions. Within this category of alternative measures, however, is the consideration that the highway is limited to passenger vehicles only. This restriction has been legislatively imposed after careful evaluation of the objectives intended for this highway. As a legislatively-mandated requirement, however, this restriction could be revised if sufficient cause was evidenced. This would, however, require extensive study of the basic decision by the transportation agencies at the Federal and state levels, which has been deemed to be beyond the scope of the current study. It was also pointed out during a public meeting that the Highland Scenic Highway in the Shavers Fork area tended to duplicate the opportunity to view this unique area afforded by the Cass Scenic Railroad. This, of course, must be considered within the context as a valid alternative to the opportunity provided by the Highland Scenic Highway.

In addition to the consideration of terminating the Cheat Mountain alternative (Alternative 2) into U.S. Route 219 northwest of Mace Knob as previously discussed, consideration has been given to terminating the extension of the Highland Scenic Highway at or in the vicinity of West Virginia Secondary Routes 9 or 1/3. The basis for this consideration is that a sufficiently lengthy addition, approximately 9 to 10 miles, to the Highland Scenic Highway would be provided. The northern terminus at these locations with improvements of Secondary Routes 9 and 1/3 would provide convenient access from the south to the Snowshoe Ski Resort, the Town of Cass, the Cass Scenic Railroad and other points of interest near these locations. This extension would, of course, significantly reduce costs of construction and land acquisition while still provide the opportunity for viewing particularly interesting scenery.

The extension of the Highland Scenic Highway to these locations, however, would not provide logical termini into the area's highway system. It especially would not accomplish the legislatively mandated requirements to connect to U.S. Route 250 or provide a means of controlling water quality in the Shavers Fork. It does, however, represent a logical intermediate goal which upon completion would be of immediate benefit to the recreational and historic sites which could be served from these termini. It is also believed that based on the past history of the rate of construction, a number of years would pass before construction was completed to this area. This would permit the postponement of a final decision for the further extension of the Highland Scenic Highway to the north until a later date. In view of the current status with regard to mining and timber harvesting operations within the upper Shavers Fork watershed, it may be desirable to postpone a decision in this area until a clearer picture of further economic and energy requirements emerges.

The extension of the Highland Scenic Highway would be constructed as several intermediate construction contract sections. The limits for these sections would be established based largely on engineering considerations

including related costs of construction and land acquisition. Because of the legislative mandate pertaining to the Shavers Fork area, it would be likely that land acquisition would advance well ahead of the actual construction of the highway. Construction could be anticipated to be carried out with the sequence of construction contract sections being from south to north. Construction within each contract section, however, might be performed from either end or from immediate points. Ease of access to the project area would be a major determinant in this decision. As much as possible, the roadway would be extended to intersecting roads so that through traffic could be accommodated, avoiding the necessity for motorists to turn around at the end of the completed section and returning to a point of access to leave the scenic highway. It might be necessary for a contract section to remain closed until consecutive sections have been completed. The selection of construction contract limits would remain a consideration into the final design phase. Since there are so few opportunities to connect the project to existing roads, construction might proceed through several construction contract sections before a convenient access can be provided. Providing temporary connections by reasonable short intersecting roads would also be considered to permit the early utilization of completed construction contract sections.

EFFECTS OF IMPLEMENTATION

SECTION V

V. EFFECT OF IMPLEMENTATION

A. RESULTS OF ENGINEERING ANALYSIS

1. Design Parameters

The design criteria recommended for the proposed alternatives were shown on Table 35. These criteria provided for an arterial roadway to be specifically designed and built as a highway for scenic viewing and recreational driving. The design speed for this highway is established as 40 mph, although a design speed of 30 mph is permitted on limited sections of the highway where it is desired to avoid excessive alternations of the landscape.

The modification of the design criteria for the proposed Highland Scenic Highway extension to a 30 mph design speed differs substantially from the criteria used for the portion of this highway previously constructed. On the portion of the Highland Scenic Highway already constructed, the design standards permitted an overall speed limit of 45 mph. On the proposed extension, the lowering of the design speed permits the highway construction to reduce or avoid excessive landscape alterations which have been a source of criticism for the completed portion. The effect of the lower design speed criteria in limited sections on the proposed extension, however, would not diminish the objective for this highway section as a roadway for recreation and scenic viewing at moderate speeds.

2. Engineering Features

Major engineering features of the build alternatives were summarized in Table 36, and described in detail in a technical report supporting this EIS.[60] Alternative 4 would require the least excavation, approximately 1.7 million cubic yards less than Alternative 1. Alternative 4 would also have the least distance requiring severe grades and horizontal curvature. However, because Alternative 4 is located near the Shavers Fork, this alignment would require more drainage structures and a more costly grade - separated structure than the other alternatives.

From an engineering standpoint, two severe problem areas have been identified where design of the highway would be extremely difficult. Unfortunately, the most severe problem area is located on Segment A and is common to all alternatives. The section of this segment which passes to the east of Buzzard Ridge and Gibson Knob would be extremely difficult to design and construct. The slopes along the east side of Gibson Knob are extremely steep and have a high landslide potential as the soil types (Meckesville and Teas) over the geological formation (Mauch Chunk) present significantly high instability and very poor drainage characteristics. Additional studies have been undertaken to determine the feasibility of an alignment west of Gibson Knob to avoid these conditions. The other severe problem

area has been identified on Segment B, common to Alternatives 1, 3, and 4, where the alignment crosses the steep slope south of Thorny Flat. Within this area, a high landslide potential (Teas soils over Mauch Chunk geology) also exists. The soils within this section of the highway are also highly erodible. In either of these locations, the design and construction of roadway excavations and embankments, overcoming the physical hazards to provide the severe roadway curvatures and grades required, are difficult to accomplish.

3. Project Costs

a. Acquisition Program

The acquisition programs for each alternative have been described in Section IV, and are shown on Figures 20A through 20M. Table 37 presented the acquisition criteria.

While most of the lands within the area proposed for acquisition with each of the build alternatives are in private ownership, there are lands which have been previously acquired by the Federal government included within the proposed acquisition areas.

Estimates of the lands (in acres) already included in the National Forest System for each of the proposed alternatives are:

Alternate	Fee Simple Acquisitions	Easements	Total
1	210	3,530	3,740
2	105	3,242	3,347
3	197	2,521	2,718
4	197	2,521	2,718

Costs for the acquisition programs have been estimated from data and information collected from the Pocahontas and Randolph County Tax Assessors Offices, U.S. Forest Service, and other knowledgeable local sources. The following values were used in estimating costs for land acquisition.

Type of Land	Value Per Acre
Woodland	$350
Improved/Pasture Land	$450
Woodland w/coal	$550

Most of the lands contained in the acquisition program are considered to be woodland, however, some improved/pasture lands exist in the southern portion of the immediate project area, and lands containing coal deposits exist in the northern portion of the immediate project area. Table 44 provides the acreage and acquisition costs estimated for each alternative to provide the minimum acquisition program needed to meet the goals and objectives established for the Highland Scenic Highway.

TABLE 44

ESTIMATE OF ACREAGE AND COST
REQUIREMENTS: LAND ACQUISITION PROGRAM

Alternative	Fee Simple Acquisition				Easements		Land Acquisition Totals		Admin.	Total Program
	Construction Corridor		Rehabilitation Areas							
	Acres	Cost (000)	Acres	Cost (000)	Acres	Cost (000)	Acres	Cost (000)	Cost (000)	Cost (000)
1	4,434	$1,995	463	$208	31,881	$12,274	36,778	$14,477	1,050	15,527
2	4,130	$1,858	672	$302	32,445	$12,491	37,247	$14,651	1,060	15,711
3	4,796	$2,158	713	$321	44,745	$17,227	50,254	$19,706	1,430	21,136
4	3,996	$1,798	808	$364	36,213	$13,942	41,017	$16,104	1,180	17,284

TABLE 45

RECREATION PROGRAM CONSTRUCTION COST

Alternative	Overlooks	Comb. Picnic	Trails	Total
1	$618,310	$375,374	$126,225	$1,119,909
2	$449,680	$563,061	$ 70,125	$1,082,866
3	$674,520	$140,250	$140,250	$1,377,831
4	$562,100	$375,374	$144,925	$1,082,399

ADDITIONAL COSTS FOR PROPOSED
BIKEWAY CONSTRUCTION[1]

Alternative	Cost
1	$3,374,264
2	$3,077,076
3	$3,463,683
4	$3,046,393

[1]Costs of Bikeway Construction are not included in Total Recreation Program Costs as this facility remains optional.

In addition to the actual costs paid for the acquisition of lands, there are associated administrative costs to be considered as these costs tend to be quite significant in themselves. These related administrative costs include costs of appraisal, negotiation, surveys and possible condemnation proceedings. These costs will vary with the size and number of tracts, conditions contained in deeds, number of transactions requiring condemnation, and other similar factors. Based on the Forest Service's past experience, probable administrative costs related to the acquisition programs have been projected for each of the alternatives under consideration. These administrative costs have been included in Table 44 to provide the overall cost required for each alternative acquisition program.

During a public participation meeting, it was questioned if costs for land severance had been considered in establishing values of land to be acquired. Land severance occurs when a right-of-way bisects a property leaving two, or more, separated parcels. Because the right-of-way may isolate one or more of the separated parcels or may make the remaining property unsuitable for the existing land use or other land uses of equal value, frequently the settlement for the right-of-way acquisition is adjusted to provide equitable compensation for the land severance. In view of the procedures to establish the acquisition programs, considerations of land severance have not been considered in detail. Generally, all properties which would be normally evaluated for effects of land severance have been included within the areas for which scenic easements would be acquired. It is in keeping with Federal policy for acquisitions of National Forest System land to negotiate acquisitions in whole tract lots. Because of the extent of many of the tracts traversed by the proposed highway alternatives this policy may not be consistently applied with respect to this project. A major consideration in the decision to exercise full tract acquisitions at the time of purchase would be the wishes of the tract-holder. Analyses and decisions of this nature would occur during subsequent phases of project development when a selected alternative is evaluated.

The acquisition programs would not require the relocation of any families or businesses.

b. Reclamation Programs

In the overall acquisitions program, it is recommended that lands which were surface-mined prior to the enactment of Surface Mining Control and Reclamation Act and which have not been adequately restored, be acquired in fee under the proposed acquisition programs. This would permit these lands to be restored to an adequate condition consistent with the visual quality of adjacent lands. Restoration of this land, done in conjunction with the construction of any of the alternatives, would provide a use for excavated material from the roadway construction in excess of that used for roadway embankments. In addition to providing disposal sites for the excess excavation, the availability of these materials as backfill at the reclamation sites would significantly reduce the requirements for additional backfill materials. It is estimated the following volumes of material would be required to backfill the existing surface mined area which have not previously been restored. Materials available from the roadway construction are also shown:

Alternative	Backfill Required	Exc. Excav. Avail.	Bal. Req'd.
1 & 2	210,000 C.Y.	107,000 C.Y.	103,000 C.Y.
3	330,000 C.Y.	263,000 C.Y.	67,000 C.Y.
4	360,000 C.Y.	143,000 C.Y.	217,000 C.Y.

With Alternatives 1, 2 and 4, the excess excavation would be from the highway construction section immediately adjacent to the reclamation area, so that this material could be supplied to the reclamation area at little or no additional cost. For Alternative 3, an average haul distance of 3 miles would be necessary to move the excess excavation to the reclamation area. Additional costs of $395,000 are projected to provide for the movement of this material.

While the additional material required in the reclamation areas may be acquired by adjustment of the roadway slopes, for an estimate of costs it is considered the additional backfill material is obtained from other sources. Costs for the final grading and for seeding and mulching to restore the surface area and reduce erosion are also included in the overall costs of reclamation. The following costs have been projected for the necessary reclamation with each alternative:

Alternative	Add. Backfill	Seeding & Mulching	Total
1	$ 515,000	$27,000	$ 542,000
2	515,000	27,000	542,000
3	730,000	43,000	773,000
4	1,085,000	47,000	1,132,000

c. Construction Costs

Construction and engineering costs for the build alternatives are summarized in Table 36. Alternative 4 would be the least costly and Alternative 1 would cost the most. Much of the difference in construction costs is due to differences in quantities of excavation and required earthwork.

d. Recreation Program

A summary of costs of the recreation programs for each build alternative is given in Table 45. The program for Alternative 4 would be the least costly.

e. Mitigation Costs

The soils and geological investigation has disclosed several areas where erosive soils would be exposed by construction activities. These potential erosion impacts are discussed in Sections V.E.3 and 4. As pointed out in those discussions, it is expected that erosion, and thus stream sedimentation can be controlled in the study area through the use of proper mitigation procedures and techniques. However, because the potential for erosion-related impact would be critical at several places along the proposed build alternatives, the costs of controlling erosion and sedimentation would be substantial. Due to the importance of implementing these procedures and

techniques, estimated costs for erosion and sedimentation control have been developed, as shown in Table 46. Alternative 4 would be the most costly for erosion control and Alternative 2 the least.

f. Highway Maintenance

The maintenance of the extension of the Highland Scenic Highway would include routine activities such as roadway patching, joint and crack sealing, shoulder regrading, debris removal, drainage structure and culvert cleaning and snow removal. These activities are normally accomplished at costs of approximately $3,000 a mile annually, based on costs to maintain state roads in Pocohontas County. These costs do not include major maintenance costs such as bridge replacements or large resurfacing projects. However, since the Highland Scenic Highway would be located at the highest altitudes of any highway ever constructed in the State of West Virginia, costs for snow removal could vary widely and could be extremely high. For the completed 22 mile section, snow removal costs have been estimated to range from $100,000 during a winter with average snows to $260,000 for a winter with heavy snow. It is estimated that snow removal would constitute 80 to 90 percent of the total annual maintenance cost.

Maintenance of the Highland Scenic Highway is a U.S. Forest Service responsibility. Since the Forest Service is not equipped to provide highway maintenance, an agreement has been made with the West Virginia Department of Highways to include the existing section of the Highland Scenic Highway in their highway maintenance program. It is likely a similar agreement would be undertaken to provide maintenance on the proposed extension.

It is anticipated normal annual maintenance costs for each of the proposed alternatives would be as follows:

Alternative	Annual Maintenance Cost
1	$116,700
2	$105,600
3	$119,500
4	$104,340

g. Summary of Costs

A summary of costs necessary to implement each of the proposed build alternatives is provided in Table 47. The total costs shown include: the costs for land acquisitions, including those acquired in fee for right-of-way and reclamation areas and those for which easements would be taken for visual management control; construction and engineering costs to provide the highway; costs for the proposed recreational development programs; costs for reclamation of previously surface-mined areas; and the costs to mitigate potential erosion impacts.

TABLE 46

SUMMARY OF
EROSION AND SEDIMENTATION CONTROL COSTS

<u>Alternative No. 1</u>	
Segment A -	$ 175,000
Segment B -	266,050
Segment G -	142,600
Segment C -	189,200
	$ 772,850 Total
<u>Alternative No. 2</u>	
Segment A -	$ 175,000
Segment D -	289,250
Segment C -	189,200
	$ 653,450 Total
<u>Alternative No. 3</u>	
Segment A -	$ 175,000
Segment B -	266,050
Segment E -	36,800
Segment H -	311,650
	$ 789,500 Total
<u>Alternative No. 4</u>	
Segment A -	$ 175,000
Segment B -	266,050
Segment E -	36,800
Segment F -	585,050
	$1,062,900 Total

Notes:

1. Costs include filter fabric silt fences, sediment traps and ponds, temporary berms, temporary slope drains and diversion ditches, reseeding, soil binders, in-stream cofferdams and rock barriers, maintenance of devices.

2. Seeding and mulching costs have been included in the construction costs shown on Table 36.

TABLE 47

SUMMARY OF OVERALL IMPLEMENTATION COSTS
FOR BUILD ALTERNATIVES ($000's)

Costs	Alternative			
	1	2	3	4
Land Acquisition	15,527	15,711	21,136	17,284
Construction & Engineering	42,091	39,021	37,225	35,275
Land Reclamation	542	542	773	1,132
Recreation Program[1]	1,120	1,083	1,378	1,082
Mitigation	773	653	790	1,063
TOTAL	60,053	57,010	61,302	55,836

[1]Bikeway Construction not included.

Ranking the alternatives in accordance with the implementation costs, Alternative 4, the Shavers Fork Alternative is the least costly at \$55.8 million. Alternative 2, the Cheat Mountain Alternative, is second, costing \$1,174,000 (2.1%) more than Alternative 4. The most costly alternative is Alternative 3, the Back Allegheny Mountain Alternative, which costs \$5,633,000 (9.8%) more than Alternative 4.

4. <u>Traffic Volumes and Use Patterns</u>

Traffic volume projections upon which a highway project is designed are normally based upon a twenty-year period of time after the estimated completion date for the highway. Because the completion date for the construction of the extention of the Highland Scenic Highway is uncertain, the year 2005 has been selected as the earliest date, and probably the most reasonable date for the projection of future traffic volumes. Based on traffic data and projections prepared by the West Virginia Department of Highways and the U.S. Forest Service, traffic volumes for 1979, the year in which actual traffic data is available, 1985, the earliest date for which the completion of construction can be projected, and 2005, a twenty-year period from the earliest possible completion, have been developed for this study (Table 48).

As a highway intended for scenic viewing and recreational use, traffic on the Highland Scenic Highway would vary significantly with the season. The review of statistics on visitors for recreational purposes in the Monongahela National Forest indicates June, July and August are the months in which most visits to the Forest occur. In late September and October, there is a large influx of visitors for the fall foliage season. Fishing and hunting also attract large numbers of visitors to the area on a seasonal basis. In the winter, the primary attraction for visitors is skiing and winter sports.

Based on the study area traffic assignments prepared in conjunction with their Corridor "H" study, the West Virginia Department of Highways has determined that recreational traffic on U.S. Route 219 is approximately 35 to 40 percent of the total traffic.[4] These determinations are in agreement with other estimates of the volumes of traffic which would use the Highland Scenic Highway for recreation use. Based upon this determination, 40% of the traffic projected for the sections of U.S. Route 219 and West Virginia Routes 28 and 92 paralleling the Highland Scenic Highway has been assigned to the Highland Scenic Highway. These traffic volumes, expressed as Average Daily Traffic (ADT), represent the minimum traffic volumes to be expected on the scenic highway. The projected Average Daily Traffic for the years 1985 and 2005 are shown on Table 48.

Each of the alternatives proposed for the extension of the Highland Scenic Highway have a common intersection with U.S. Route 219 at the southern terminus of the project. The northern termini of the alternatives at U.S. 250 are within 3.6 miles of each other. The terminus of the Alternatives 1 and 2 at Cromer Top would tend to favor traffic movements to the north and west via U.S. Routes 250 and 219. The terminii at Cheat Bridge of Alternatives 3 and 4 would tend to favor traffic movements to the north and east via Route 250,

TABLE 48

ESTIMATED AVERAGE DAILY TRAFFIC (ADT) VOLUMES
HIGHLAND SCENIC HIGHWAY - BUILD AND NO-BUILD ALTERNATIVES

ROUTE/SEGMENT	1979	BUILD ALTERNATIVES 1985	BUILD ALTERNATIVES 2005	NO-BUILD ALTERNATIVE 1985	NO-BUILD ALTERNATIVE 2005
U.S. Route 219					
S. of Hillsboro	850	965	1,475	965	1,475
N. of Mill Point	1,500	1,705	2,615	1,705	2,615
N. of Buckeye	1,900	2,160	3,290	2,160	3,290
N. of Marlinton	2,900	4,175	6,550	3,310	5,135
S. of Edray	900	1,895	2,915	1,030	1,600
S. of Marys Chapel	500	345	550	575	920
S. of Linwood	450	310	480	515	800
S. of Mingo	500	345	550	575	920
N. of Mingo	900	620	960	1,030	1,600
N. of Valley Head	1,100	750	1,165	1,250	1,940
N. of Elkwater	1,500	1,025	1,570	1,705	2,615
S. of Huttonsville	1,400	950	1,425	1,580	2,375
U.S. Route 250					
W. of Bartow	1,800	2,645	4,110	2,055	3,200
W. of Durbin	950	1,680	2,630	1,090	1,720
E. of Cheat Bridge	750	1,430	2,145	840	1,235
@ Cromer Top	900	1,660	2,550	1,030	1,600
E. of Huttonsville	1,700	2,560	3,900	1,930	2,950
West Virginia Route 28					
N. of Huntersville	600	410	610	680	1,020
N. of Dilleys Mill	600	410	610	680	1,020
West Virginia Routes 28 & 92					
S. of Green Bank	1,300	890	1,365	1,480	2,275
N. of Arbovale	1,100	750	1,165	1,250	1,940
S. of Bartow	1,300	890	1,365	1,480	2,275
West Virginia Route 39					
E. of Huntersville	1,300	1,480	2,275	1,480	2,275
W. of Huntersville	800	545	815	905	1,355
E. of Marlinton	1,900	1,295	1,975	2,160	3,290
(Marlinton to Mill Point - See U.S. Route 219)					
W. of Mill Point	950	1,050	1,750	1,050	1,750
E. of Cranberry Visitors Center	500	575	920	575	920
Highland Scenic Highway					
N. of Cranberry Visitors Center	-	805	1,270	600	900
W. of U.S. Route 219	-	805	1,270	600	900
E. of U.S. Route 219	-	1,070	1,685	--	-
S. of Sec. Rte. 9 (or 1/3)	-	1,070	1,685	-	-
N. of Sec. Rte. 9 (or 1/3)	-	1,220	1,860	-	-
S. of U.S. Route 250	-	1,220	1,860	-	-

28 and 33. It is estimated, however, that approximately equal volumes of traffic would be diverted to the Highland Scenic Highway from the highway network north of the study area regardless of the terminus. As a result, the average daily traffic (ADT) for each of the alternatives at the northern end of the project would be approximately the same.

The only other point of access to the extension of the Highland Scenic Highway would be at either Secondary Route 9 or 1/3, depending on the alternative considered. The intersection of either of these routes with the proposed Highland Scenic Highway alternatives would serve traffic needs to the Snowshoe Resort and the adjacent condominium areas as well as local traffic to the Linwood - Slaty Fork area. An intersection at any of these locations would also provide access to the Town of Cass, the Cass Scenic Railroad, Clover Lick, Stony Bottom, Seneca State Forest and other areas along the Greenbrier River. Improvement of Secondary Routes 9 and 1/3 would be of advantage for traffic to and from these areas which would also use the Highland Scenic Highway.

Average daily traffic (ADT) volumes for the proposed Highland Scenic Highway and the major nearby Federal and State Routes are shown on Table 8. Based on the available traffic data for 1979, ADT volumes for 1985 and 2005 have been projected both with the construction of the extension of the Highland Scenic Highway - the build alternatives, and without the construction of the Highland Scenic Highway - the no-build alternative. Typical of a highway designed for scenic and recreational use, the projected ADT volumes are low when compared to those for highways which are intended for more general use. Determinations of ADT volumes are essential to the estimation of annual usage for expenditure justification, in the design of structural elements of the highway, and in estimating future traffic from which design hour volumes can be determined. In the case of seasonal use highways, however, ADT volumes have limited value in determining the need of the highway for the movement of traffic.

Consultation with the West Virginia Department of Highways and the Federal Highway Administration indicates that there are no plans for major improvements in the U.S. Route 250 corridor within the foreseeable future. This restricts the potential for significant increases in the traffic volumes on this highway in the short-term future.

5. Safety

The criteria as recommended for the design and construction of each of the proposed alternatives would provide adequate safety to all motorists using the highway within the designated design speeds. For most of the highway with any of the alternatives, a design speed of 40 mph (maximum curvature of 120') is provided. There are, however, sections where the curvature has been increased to permit the roadway to be located in closer conformity to the terrain configuration to avoid excess earthwork. In these sections, a maximum curvature of 23° has been used, reducing the design speed to 30 mph.

On Segment A, common to all alternatives, approximately 2,000 feet of roadway is on curvature of 23°, 550 feet is on curvature of 19°, and 950 feet is on curvature of 15°. On Segment B, common to Alternatives 1, 3 and 4, approximately 1,450 feet of the roadway is on curvature of 23°. It is recommended that reduced speeds zones be established within these areas where the design speed has been reduced.

Stopping sight distances on all of the alternatives are consistent with grades and curvatures within the established design speeds, however, the highway would have to be inspected in the field following construction to assure that passing zones are properly designated. A minimum passing sight distance of 1500 feet is established in the criteria, but in conditions where excessive grades and curvature are encountered, it would be prudent to examine these relationships closely after construction.

The steep slopes of embankments and side hill cuts can be hazardous for vehicles which leave the roadway. Extensive use of guardrail to retain vehicles leaving the roadway is recommended. While guardrail tends to reduce the ability to view the scenery, nevertheless, consideration of the safety guardrail provides dictates a strong reliance on its use on highways of this type. Wherever possible, terrain conditions permitting, flattening of side slopes would also be considered as, in many cases, vehicles leaving the roadway can be more safely retained in moderately-sloped areas than by guardrail.

Safety would also be a consideration for those who have left their cars at scenic overlooks or other parking areas. As necessary, cautionary measures would be provided to warn pedestrians of hazards such as precipitous slopes and other dangers. Barriers or fencing would be provided as necessary to restrict movement into hazardous areas.

B. SUITABILITY FOR SCENIC HIGHWAY PURPOSES

1. Quality of Recreation Experience

The recommended recreation program was dicussed in Section IV. Tables 40 through 43 list the recreation activities for each alternative and Figures 20A through 20M locates them. The activities recommended are only those necessary for user enjoyment of the highway and include overlooks, picnic areas, interpretive trails and bike lanes. The primary recreation activities associated with the build alternatives are auto touring and viewing of outstanding scenery.

The U.S. Forest Service's Recreation Opportunity Planning Process utilizes the Recreation Opportunity Spectrum (ROS) system to define publicly desired recreation opportunities and to identify existing and potential recreation opportunities in a National Forest.[64] The ROS is shown in Table 49 along with its activity opportunities, recreational settings, and experience opportunities. The ROS has been applied to each of the alternatives to

TABLE 49

RECREATION OPPORTUNITY SPECTRUM (ROS)

The associated activity opportunities, recreational setting requirements, and experience opportunities that are highly probable for each Recreation Opportunity Spectrum class. There may be specific activity exceptions to these general characteristics. (This table is for illustrative purposes only. Use the six Recreation Opportunity Spectrum class delineation criteria to identify actual areas.)

Spectrum Class	Primitive (P)	Semi-primitive non-motorized (SPNM)	Semi-primitive motorized (SPM)	Roaded Natural Appearing (RN)	Rural (R)	Modern-urban (MU)
Activity Opportunities	Viewing Outstanding Scenery Enjoying Unique and/or Unusual Environments Hiking Cross-country ski touring and snowshoeing Horseback Riding Canoeing Sailing Other, nonmotorized watercraft use Swimming Diving (Skin or Scuba) Fishing Photography Camping Snowplay Hunting (big, small game, upland birds and waterfowl) Nature Study Acquiring General Knowledge/Understanding Unguided Hiking General Information		Viewing Outstanding Scenery Enjoying Unique and/or Unusual Environments Hiking Cross-country ski touring and snowshoeing Horseback Riding Canoeing Sailing Other, nonmotorized watercraft use Swimming Diving (Skin or Scuba) Fishing Photography Camping Snowplay Hunting (big, small game, upland birds and waterfowl) Nature Study Acquiring General Knowledge/Understanding Unguided Hiking General Information Motor-driven ice and snowcraft ORV touring Power boating	Viewing Outstanding Scenery Enjoying Unique and/or Unusual Environments Hiking Cross-country ski touring and snowshoeing Horseback Riding Canoeing Sailing Other, nonmotorized watercraft use Swimming Diving (Skin or Scuba) Fishing Photography Camping Snowplay Hunting (big, small game, upland birds and waterfowl) Nature Study Acquiring General Knowledge/Understanding Unguided Hiking General Information Motor-driven ice and snowcraft ORV touring Power boating Picnicking Gathering Forest Products Auto Touring Water Skiing & Other Water Sports Automobile Camping Trailer Camping Viewing Interpretive Signs Organization Camping Lodges Resort-Commercial Public Services Resort-Lodging	Viewing Outstanding Scenery Enjoying Unique and/or Unusual Environments Hiking Cross-country ski touring and snowshoeing Horseback Riding Canoeing Sailing Other, nonmotorized watercraft use Swimming Diving (Skin or Scuba) Fishing Photography Camping Snowplay Hunting (big, small game, upland birds and water fowl) Nature Study Acquiring General Knowledge/Understanding Unguided Hiking General Information Motor-driven ice and snowcraft ORV touring Power boating Picnicking Gathering Forest Products Auto Touring Water Skiing & Other Water Sports Automobile Camping Trailer Camping Viewing Interpretive Signs Organization Camping Lodges Resort-Commercial Public Services Resort-Lodging Competition Games Ice Skating Scooter-Motorcycle Use Bicycling Spectator Sports Jogging Passive use of developed parks and open space Picnicking Outdoor Concerts	
Recreational Settings	Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other area users is minimal. The area is managed to be essentially free from evidence of man-induced restrictions and controls. Motorized use within the area is not permitted.	Area is characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is not permitted.	Area is characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is permitted.	Area is characterized by predominantly natural appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are primarily to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of man are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of man, on-site, are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.
Experience Opportunities	Extremely high probability of experiencing considerable isolation from the sights and sounds of man, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman skills in an environment that offers a high degree of challenge and risk.	High, but not extremely high, probability of experiencing the above listed natural environment elements.	Moderate probability of experiencing the above listed natural environment elements, except that there is a high degree of interaction with the natural environment. Opportunity is available to use motorized equipment while in the area.	About equal probability to experience affiliation with other user groups and for isolation from sights and sounds of man. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible.	Probability for experiencing affiliation with individuals and groups is prevalent as is the convenience of sites and opportunities. These factors are generally more important than the setting of the physical environment. Opportunities for wildland challenges, risk-taking, and testing of outdoor skills are generally unimportant except for specific activities like downhill skiing, for which challenge and risk-taking are important elements.	Probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risks afforded by the natural environment, and the use of outdoor skills are relatively unimportant. Opportunities for competitive and spectator sports and for passive uses of highly man-influenced parks and open spaces are common.

determine their compatibility with a preliminary ROS analysis for the Monongahela National Forest which indicated a need for a modest increase in the "Roaded Natural Appearing" category primarily for developed recreation facilities and a significant increase in "Semi-Primitive Motorized" and "Non-Motorized" categories for dispersed recreation.

While decisions on the needs to be met through changing or continuing current ROS classes cannot be made until the Forest Land and Resources Management Plan is completed (scheduled for 1983), a preliminary analysis of the alternatives utilizing the Recreational Opportunity Spectrum indicated that the build alternatives are consistent with the needs identified in the preliminary ROS analysis of the Monongahela National Forest (Table 50). The no-action alternative appears to be less consistent with these needs than are the build alternatives.

The highway is not critical to meeting these identified needs and it is probable that implementation of any of the build alternatives would result in new needs for a variety of recreation opportunities in these three ROS categories.

Table 51 identifies the number of overlooks, picnic areas, and interpretive trails. Utilizing available information, it is impossible to differentiate among the overall qualities of recreation experience for the alternatives or to rank the alternatives in terms of quality of recreation experience. However, it is possible to rank the alternatives in terms of their interpretive trail quality. Alternatives 1 and 3 equally provide the highest quality of interpretive trails followed by Alternative 4 and finally Alternative 2. The build alternatives all possess an adequate quantity of overlooks and picnic areas, and all would significantly increase opportunities for high quality auto touring and scenic viewing experiences. The quality of the views from the alternatives will be analyzed in a subsequent portion of this document.

2. Scenic Qualities

As just discussed, the primary recreational purposes of the proposed Highland Scenic Highway extension are auto touring and viewing outstanding scenery. To determine the visual qualities and visual quality objectives for the project area the Forest Service's Visual Management System was utilized.[62] This analysis identified an abundance of Class A or visually distinctive elements within the area's landscapes under existing conditions (no-action alternative) and with the implementation of any of the build alternatives. These distinctive elements include landforms, vegetative patterns, water forms, and rock formations. The difference among the various alternatives is in their ability to facilitate views of the landscape. The major difference between the build and no-build alternatives is the ability of the build alternatives to furnish long views from high elevations and, additionally, views of landscapes such as the Shavers Fork watershed which are currently not available. Although outstanding views abound from existing roads in the area, implementation of any of the build alternatives would significantly increase opportunities for viewing outstanding scenery.

TABLE 50

PROJECTED CHANGES IN ACREAGE BY ROS CATEGORY

	Semi-Primitive Motorized	Roaded Natural Appearing	Rural
Alternative 1	-20,000	+20,000	No Change
Alternative 2	-20,000	+20,000	No Change
Alternative 3	-17,000	+17,000	No Change
Alternative 4	-12,000	+12,000	No Change

TABLE 51

SUMMARY OF RECREATIONAL FACILITIES

	Overlooks	Picnic Areas	Interpretive Trails
Alternative 1	13	2	4
Alternative 2	11	3	3
Alternative 3	15	3	4
Alternative 4	12	2	4

Alternative 1 - Cheat Mountain/Shavers Fork

The significant vistas obtained by this alignment include views of the Gay Knob-Chestnut Flat-Cloverlick Mt. group (seen from all alternatives).

This alternative offers interesting views of the geologic saddle formation, and excellent long views into the Greenbrier Valley from atop Thorny Flat at elevation 4,750 (seen from Alt. 3 & 4 also). A direct view of the Snowshoe Resort is available as well. Other views of interest include the location of the Town of Spruce, the WMRR Horseshoe Curve and the Railroad Cut. Opportunities for vistas into the Tygart Valley and Rt. 219 are also available.

The foreground vegetation along this alignment is primarily good quality stands of northern hardwoods, mixed hardwoods, and some mixed spruce forests. Some old fields are located near Big Spring Fork, while sappling areas are located near Crouch Knob.

Alternative 2 - Cheat Mountain

The views offered by this alternative lack the diversity offered by the other build alternatives.

The viewing orientation offers only limited views of the Shavers Fork valley. Good views are presented of the Gay Knob-Chestnut Flat-Cloverlick Mt. group. An overlook area located at Tallow Knob offers good views to Cheat Mt. and the spruce stands on Thorny Flat. The alignment allows for good vistas into the developed Tygart Valley. Other views of significance include the location of the Town of Spruce, the WMRR Horseshoe Curve and the Railroad Cut.

The foreground vegetation along this alignment is generally of good quality and consists of fields and pasture near Big Spring Fork. Some sappling areas are located near Crouch Knob.

Alternative 3 - Back Allegheny Mountain

The views from this alternative are the most diverse of any. As with other alternatives, a view of the Gay Knob-Chestnut Flat-Cloverlick Mt. group is obtained. A clear view of the geologic saddle and excellent long views into the Greenbrier Valley from atop Thorny Flat are gained (seen from Alt. 1 & 4 also). The alignment offers a direct vista to the Snowshoe Resort and views to the location of the town of Spruce, the WMRR Horseshoe Curve and the Railroad Cut. The highway rises to the top of the Back Allegheny Mt. where the most dramatic vistas are obtained into the Shavers Fork watershed and the Greenbrier Valley and beyond. Views are also presented of the National Radio Astronomy Observatory and spruce forests.

The foreground vegetation for the Back Allegheny Mt. alternative is fair. It is similar in composition to the other alignments except for larger areas of cuts and saplings.

Alternative 4 - Shavers Fork

The views from this alternative are various and diverse but the number of long views from higher elevations is limited. The alignment presents views of the Gay Knob-Chestnut Flat-Cloverlick Mt. group, the geologic saddle, long views from the top of Thorny Flat and the Snowshoe Resort in the same viewing stations as the Cheat Mt./Shavers Fork and the Allegheny Mt. alternatives. The highway then follows the Shavers Fork and lower elevations through the study area. Although the proximity to the water enhances water-related opportunities, the vistas of the segment are constricted by the higher elevations of the knobs. The opportunities for long views are basically eliminated in this segment. Views are obtained of the location of the Town of Spruce, the WMRR Horseshoe Curve and the Railroad Cut.

The foreground vegetation along this alignment is of the best quality for any alignment. Strong stands of spruce are evident, with few clearcut or sapling areas.

No-Action Alternative

As previously discussed the no-action alternative presents many high quality scenic viewing opportunities from existing roads.

However, it would not increase the opportunity for additional long views from higher elevations as would the build alternatives. Additionally, it would not create visual accessibility to some outstanding scenery, particularly in the Shavers Fork watershed which currently cannot be viewed.

The criteria utilized to compare the scenic qualities of the alternatives is the variety and diversity of the long views. The foreground view is important but relatively insignificant for comparison purposes since it can be altered. Vegetation is an extremely important element of the foreground view and can be varied to achieve desired visual qualities. Its height and distance from the highway can also be varied to either buffer or highlight longer views.

Applying the variety and diversity of long views criteria to the alternatives results in the no-action alternative providing the least high quality scenic viewing opportunities of the alternatives considered.

3. Opportunities for Developed and Dispersed Recreation

The final recommended recreation program discussed in Section IV is the product of a thorough evaluation, which initially included identification of a comprehensive range of recreational opportunities associated with each alternative. These Future Recreational Opportunities programs, included in detail as an addendum to the technical report describing alternatives,[60] contain all of the activities contained in the recommended recreation program and, additionally, campsites and hiking trails. In keeping with U.S. Forest Service plans and policies, dispersed recreational facilities have been emphasized in developing both the recommended recreation program and future recreational opportunities. However, the build alternatives present excellent opportunities for future development of both dispersed and developed recreational facilities.

The build alternatives would also provide increased access to excellent hunting and fishing areas. Only Alternative 4 - Shavers Fork, would significantly improve accessibility to area streams. If this alternative would be implemented and if the State would begin stocking the Shavers Fork and its tributaries, there could be a significant demand for fishing these streams. All the build alternatives, but especially Alternative 3, would provide access to high quality hunting lands that are presently relatively inaccessible. Implementation of any of the build alternatives would provide high quality hunting opportunities, assuming that private land owners allow hunting, and the demand could be substantial.

4. Management Needs

Visual quality objectives have been defined for each of the build alternatives and were discussed in Section IV under the acquisition (scenic easement) program. If a build alternative is selected, the scenic corridor should be managed in accordance with these visual quality objectives, which include retention and partial retention objectives, and the easement stipulations.

The need to manage a maintenance program for the highway and recreation facilities would also be associated with the build alternatives. Most of the highway maintenance work could be performed by the W.V. Department of Transportation under contract with the Forest Service. A similar arrangement currently exists for the completed portion of the Highland Scenic Highway. The Forest Service would have to perform routine maintenance work including trash removal, clearing and grubbing, and mowing at recreation facilities.

There are no management needs associated with the no-action alternative. It is not possible to determine which of the build alternatives has the greatest level of management needs.

C. SOCIAL/CULTURAL IMPACTS

1. Land Use

As indicated in Section II, area comprehensive plans project growth in the towns and villages of the two counties and subsequent increases in the amounts of land devoted to residential, commercial, industrial, and public/cultural facility land uses. The build alternatives would have an insignificant impact on increasing and speeding this growth process, and hence, in increasing the amount of land in these four categories. However, the build alternatives would cause a measurable increase, through induced development, in the amount of land devoted to commercial land use activities along roads, other than the scenic highway itself, in the immediate project area, i.e., U.S. Routes 219 and 250.

Comprehensive plans project a decrease in the amount of land devoted to agricultural land uses. The build alternatives would cause an additional reduction in the amount of agricultural land since the proposed highway would require acquisition of certain lands, particularly in Segment A, in the agricultural category. This land would enter the open space/recreation category. In the long term, a similar impact would occur to lands in the mineral extraction category that would be acquired for construction of the proposed highway and for the scenic corridor and placed in the open space/recreation category. These impacts are further discussed in Section V.D.1.

The build alternatives would cause an increase in the amount of land in the open space/recreation category by taking land from the agricultural and mineral extraction categories. Additionally, the build alternatives would generate an increase in the amount of open space/recreation land devoted to developed recreation activities such as the highway itself and related recreational developments like picnic areas and overlooks.

2. Population

Preliminary 1980 census data has indicated that population growth rates in Pocahontas and Randolph Counties between 1970 and 1980 exceeded estimates of regional planning authorities. These authorities had also developed 1990 population projections which now are in need of revision based on 1980 census data. The existing projections show an eleven percent population increase in the two-county area between 1979 and 1990.[3] Based on population increase trends indicated by the 1980 census, this increase may actually exceed eleven percent.

However, implementation of any of the build alternatives would have a relatively insignificant impact upon projected population increases in the two-county area. Essentially, most employment opportunities created by the scenic highway extension would be filled by local residents and would not attract significant numbers of new people to the area.

3. Public Utilities, Facilities and Emergency Services

As stated in the discussion of land use impacts, the build alternatives would have an insignificant impact on increasing and speeding the growth process. Hence, their impact on increasing the need for public utilities, facilities, and emergency services would be minimal. The highway and related recreation developments would require no electrical power, and the proposed highway design safety features, projected low traffic volumes, and increased human use of the area would not significantly increase the demand for emergency services. Although the build alternatives would slightly increase the potential for forest fires, this negative impact would be neutralized by improved access for fire fighting services. Minimal electric and phone utility relocation work may have to be undertaken where the build alternatives intersect utility lines along Route 9, near Thorny Flat (Snowshoe service), and near Route 250.

The build alternatives would improve emergency services' access to and from the project area, however, as previously stated, the demand for these services would not significantly increase.

In general, the impacts of all the alternatives on public utilities, facilities, and emergency services would be relatively insignificant.

4. National Radio Astronomy Observatory (NRAO)

In Section II - The Affected Environment, the NRAO was described as were the reasons it was located in Green Bank. Interference with radio astronomy, or noise, is generated by several man-made and natural sources, the most important of which are:[66]

a. Man-made interference, e.g., radio transmitters, electrical transmission and machinery, and vehicular ignition systems.*

b. Natural interference, e.g., lightning.

c. Instability of gain and noise generated in the receiver.

The interference sources associated with any of the build alternatives would be two-way radios and gasoline engine ignition systems (diesel engines do not cause a significant interference problem). Differing degrees of interference would be associated with the construction, use, and maintenance of the proposed extension, and the alternatives, because of their different locations, would cause varying degrees of interference. The degree of interference also depends on the timing, intensity, type and frequency of radio radiation at the source, the quantity of sources, and the terrain between each source and the radio telescopes.

Although difficult to quantify because of the many variables involved, under existing conditions interference from two-way radios and gasoline engine ignition systems is currently a significant problem at the NRAO, sometimes obscuring the extremely weak signals that NRAO astronomers attempt to monitor. It should also be noted that the NRAO telescopes are in use continuously (24 hours per day, seven days per week) except when "down" for maintenance.

Segment H of Alternative 3 - the Back Allegheny Mountain Alternative, lies closer (approximately 4.75 mi. from the 140 foot telescope at its closest point) to the NRAO than the others (see Figure 3). Presently, the 140 foot telescope experiences vehicular ignition interference from W.V. Route 28/92, in line-of-sight to the telescope and about one mile away.

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*Even the radio suppressed ignition system of newer vehicles emit significantly strong radio pulses.

In the 70 MHz to 150 MHz frequency range, interference pulses frequently exceed the telescope's detection level by factors of 10,000 and, occasionally, by 100,000. Segment H from about Sta. 350 near Second Fork to about Sta. 550 near First Fork is also within line-of-sight of the 140 foot telescope. Because radio power received from line-of-sight sources is proportional to the inverse square of the distance, the ignition interference level at the 140 foot telescope from Segment H would be about one-twentieth of the interference level from W.V. Route 28/92. Thus, ignition interference from Segment H would be 500 to 5,000 times greater than the detection level at the 140 foot telescope, and would add significantly to the existing interference, in proportion to the traffic density. Additionally, some of this interference would be "held" on this portion of Alternative 3 by scenic overlooks located on it as per the recreation program. Although the impact of ignition system interference from Alternative 3 is impossible to mitigate, this "holding" effect of the overlooks could be partially mitigated through the installation of signs asking motorists to turn off their engines while viewing the scenery.

Ignition system interference from Alternative 3 would also be significant during the construction and maintenance of the highway. In addition to that of gasoline engine vehicles, ignition interference could also arise from other gasoline engine equipment such as chain saws, pumps, and drilling rigs. This impact could be mitigated partially by placing restrictions on the contractor requiring him to utilize diesel powered equipment.

Because of the interference shielding effect of Back Allegheny Mountain, Alternatives 1, 2, and 4 would not add to the ignition interference level at the 140 foot telescope.

The Interference Office at the NRAO, after reviewing relevant information of this study, has estimated the potential long-range use impacts on the NRAO of the build alternatives relative to the no-build alternative.[84] Alternatives 1, 2 and 4 are projected to have minimal impact, contaminating 0.1% or less of the total astronomical data. Alternative 3 is projected to have the greatest impact, contaminating an additional 7% of the total astonomical data. There are no impacts projected with the no-build alternative.

Two way radios radiate millions of times more radio power than vehicular ignition systems, and any radio transmissions from any of the alternatives would be detectable at any NRAO telescope and, therefore, would add to the interference level. During the construction and maintenance vehicles and facilities would be especially significant. Again, restrictions placed on the contractor could help to minimize this impact but would not eliminate it. Interference from two-way radios in the vehicles of users of the proposed highway would also add to the interference level. However, this could probably be effectively eliminated through installation of signs requesting users to turn-off their two-way radios. For such a restriction to be effectively implemented, legislative action and rigorous enforcement would be necessary.

To summarize the negative impacts (interference) of the alternatives on the NRAO:

1) Ignition systems interference generated by gasoline engines would be associated with Alternative 3, Segment H, to a degree to contaminate an additional 7% of the total astronomical data. This impact could not be mitigated.

2) Interference from two-way radios would be a negative impact associated with all the build alternatives. It could be partially mitigated during construction and maintenance operations and completely mitigated with respect to highway users with appropriate legislative action and rigorous enforcement.

5. Evaluation of Consistency with Implementation of Title VI Procedures

Consideration has been given to possible impacts of the proposed project that might occur with regard to minority groups as required by Title VI, Civil Rights Act of 1964. No persons or groups which have been designated as minorities have been identified within, or in the vicinity of, the study area, and it has been determined there would be no impacts requiring furthur investigations for consistency with the implementation of Title VI procedures.

D. ECONOMIC ANALYSIS

1. Tourism

The objectives of this section are to identify how and to what extent the alternative locations, recreation development programs, and acquisition programs for the Highland Scenic Highway extension would change the study area's tourism/recreation resource base and to estimate the impacts of these changes on visitor flows and expenditures.

Two broad conclusions can be drawn at the outset:

- For tourism and recreation development, differences among the four "build" alternatives are relatively insignificant. Each alignment offers a good range of scenic and recreational opportunities, with only minor varations in quality.

- The contrast between the "no action" and the "build" alternatives is blurred by the fact that the first 22-mile segment of the Highland Scenic Highway (HSH) parkway between Routes 39 and 219 opened in the fall of 1980. Adding the 23 miles designated on Route 39, a total of 45 miles of the HSH are now open. The "build" alternatives now under study concern the 35-40 mile extension which would carry the HSH from Route 219, past the Snowshoe ski resort and close to Cass Scenic Railroad, to join Route 250 near Cheat Bridge. For this analysis, then, the "no action" alternative must recognize the existence of a 45-mile Highland Scenic Highway; the "build" alternatives will be evaluated in terms of the effects of extending the Highland Scenic Highway to a total length of 80-85 miles.

The four principal effects which the HSH extension can be expected to have on the tourism/recreation volume and in generating regional economic benefits are discussed below.

a. As an attraction. Whether 45 miles or 80 miles in length, the HSH will be an attraction of outstanding quality, adding significantly to the breadth of the regional recreation/tourism resource base and complementing existing attractions. As discussed in Section II. A. 9. present utilization patterns indicate heavy traffic during the ski season, in July and August, and on fall weekends when foliage color is at its height. But West Virginia Department of Economic Development data show that hotel occupancy in HSH counties and their neighbors in the Potomac Highland Travel Council is significantly below the statewide average in every month of the year.

A special telephone survey of area hotel/motel operators conducted as part of the research for this study clarifies the detail of present traffic patterns. Most existing facilities are geographically better situated in relation to the extension than to the existing portion of the Highland Scenic Highway. By far the largest is the Snowshoe ski resort at Slatyfork (more than 400 units which, as previously discussed, has substantial excess capacity except during the ski season). Nine facilities with about 185 rooms are located in and around Elkins; Cass, Durbin and Bartow together contain about 75 rooms; and slightly over 100 rooms are in Marlinton. Operators of these facilities generally report best occupancy in summer, approaching 100 percent on weekends and 70-80 percent during the week. In winter, overflow from Snowshoe fills the larger facilities in Elkins and Marlinton to 100 percent on weekends and 50-80 percent midweek. The small facilities and those less convenient to the resort typically report very low winter occupancy. The fall season is good (75 percent or better) for about half of the operators and not so good (below 50 percent) for the others. Spring is poor for almost everyone.

Virtually all operators, including executives at Snowshoe, are optimistic that the recently opened HSH segment will help attract off-season business; they also favor construction of the proposed extension. However, whether or not the HSH extension is completed, Snowshoe executives rate the paving of the Cass Road a top priority need (a) to improve access and cut driving time to the resort from the east, (b) to improve linkage among the area's top attractions--the Cass Scenic Railroad, Snowshoe, the HSH and other parts of the Monongahela National Forest, and (c) to broaden the potential labor pool to include towns in the vicinity of Cass which are currently extremely difficult to reach in winter.

Based on the traffic patterns of other scenic highways,* the HSH can be expected to attract heaviest volume in summer and on fall weekends, and reasonably strong volume throughout spring and fall. This pattern, which complements current use very well, would help absorb the existing unused capacity. In winter, most other highways report low traffic levels; several close whenever there is snow to avoid the expense of plowing. If the HSH is kept open in winter, traffic volume could be significant, as will be discussed in the next section.

b. As an arterial. The first segment of the Highland Scenic Highway, now open, will shorten access time to regional attractions from market areas to the west by approximately 15 minutes. Access time from other directions will not be significantly affected.

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*Richard B. Russell, Scenic Highway, Talladega Scenic Drive, Talimena Scenic Drive, Telecho Plains-Robinsville Road, Blue Ridge Parkway, and Skyline Drive. See Technical Report "Description of Alternatives[60] for descriptive information.

The proposed HSH extension would shorten driving time to Snowshoe by 15-30 minutes from market areas in all directions. From the west or south, traffic from the existing HSH and U.S. 219 would be routed over the extension rather than through Slatyfork, as at present. From the north and east, the HSH connection with U.S. 250 near Cheat Bridge would provide much more direct access than U.S. 219. Time savings result both from shorter distances over the HSH and from the higher quality of the HSH roadway. However, the HSH would not provide as extensive access improvement as would be provided by the completion of Corridor H. Further, travel time to other area attractions, principally Cass Scenic Railroad and the National Radio Astronomy Observatory, would probably not be improved unless the Cass Road were also paved.

Among alternative alignments, Alternative 2 would provide most direct and uncomplicated access to Snowshoe, connecting directly to the present entrance road. Alternatives 1, 3, and 4 intersect with the road to Cass. Clear marking of the turn would be essential and upgrading of the road may be required; driving time should be about the same as for Alternative 2.

Summarizing, the existing HSH and the proposed extension would separately and together improve the quality of the road network for inter- and intra-regional travel, providing more timely and direct access from all market areas and ameliorating safety hazards. Since an important proportion of travel demand will continue to occur during the winter ski season, it is recommended that the cost and benefits of snow plowing continue to be investigated and serious consideration be given to the possibility of keeping the road open all winter.

c. As a means of opening up previously inaccessible backcountry The Highland Scenic Highway would open up vast new areas for development of opportunities in dispersed and concentrated recreation. The recreation development program for this study concentrates on activities essential to the user's enjoyment of the highway, suggesting a complex of scenic overlooks, picnic areas, interpretive trails, and a bikeway. Additionally, Alternative 4 would offer new opportunities for fishing along the Shaver's Fork and Alternatives 1, 2 and 3 would open up new areas for hunting. Finally, a number of areas have been identified as appropriate for future development if and as visitor use indicates need for more hiking trails, primitive campgrounds, and/or developed campgrounds.

Opening up of attractions and facilities on these previously hard to reach areas would both alleviate pressures on dispersed recreation facilities where they are currently being felt on the Monongahela, and also create new opportunities for expanding the public served.

d. By taking land suitable for other tourism uses. Alternatives 1, 3, and 4 all incorporate Segment B, which crosses Snowshoe Company property in a manner which might interfere with the planned future golf course, new ski area development, and associated condominium development. Alternative 2 would also have similar impacts including those on the proposed golf course. On the positive side, these alternatives also afford excellent views of the Snowshoe development from several outlooks; the increased visibility should contribute to a stronger identity and larger visitor volume at the resort. On balance, land acquisition cost estimates in this report have assumed that the overall master plan of the Snowshoe Company would not be seriously jeopardized and that an equitable agreement could be reached concerning land values.

The preceeding four factors serve as a basis for estimating changes in estimating visitor flows which would accrue from completion of the HSH extension. Additional guidance is provided by traffic statistics of other scenic highways. Interpeting these statistics, it is anticipated usage of the HSH extension would be increased in the range of 200 to 300 cars a day in addition to those which would otherwise be attracted to the area.

Three assumptions form the foundation for estimating new visitor volume and expenditures attracted by the HSH extension.

- First, the three winter months (90 Days) are eliminated, on the basis that the HSH may be closed over most of this period, or that if it is open, any traffic using the HSH would be using it as a "convenience" routing. This traffic would be in the area whether or not the HSH extension existed and is simply diverted from other possible routings. Much of the traffic bound for the ski slopes would be in this category.

- Second, during the remaining nine months of the year it is assumed the estimated additional traffic is "new", either attracted to the area because of the HSH or held longer than would be the case without the HSH.

- Third, it is assumed that the length of time spent by visitors on the HSH would average one-half day.

Following these assumptions, approximately an additional 55,000 visitor vehicles would travel the HSH annually (275 days x 200 vehicles additional). Estimating average occupancy of 3.0 persons per vehicle* total visitor volume is anticipated to be increased by approximately 165,000 annually. During 1978, visitor expeditures in the HSH counties averaged about $27 per person over an average stay of 1.66 nights. On this basis it would seem reasonable that visitors remaining a half day longer to visit the HSH would spend an average of $10 per person in 1980 dollars. The estimated total increase in visitor expenditures, therefore, would amount to about $1,650,000 annually.

In summary, the principal impacts of the proposed HSH extension on regional tourism and recreational patterns that may be anticipated are outlined below. Except as specifically noted, the differences among the four build alternatives are minor.

- <u>Beneficial Impacts</u>

  - As an attraction of outstanding quality, the project would increase regional visitor volume by an estimated 165,000 annually. The new visitor volume would result in substantial economic benefit (an estimated $1,650,000 per year). Additional benefit would accrue from the fact

*The Blue Ridge Parkway estimates average occupancy at 3.3; Skyline Drive now estimates 2.8, down from 4.0 prior to 1978. Survey data for the Monongahela National Forest indicates an average occupancy of 3.5 persons for all visits.

- The project would improve the quality of the road network for inter- and intra-regional travel, shortening access time to major attractions by about 15 minutes and ameliorating safety hazards on existing roads. Alternative 2 would provide most direct and uncomplicated access to Snowshoe Ski Resort, the most highly developed existing area attraction.

- The project would open up previously inaccessible back country, creating new opportunities for dispersed and concentrated recreation and alleviating current pressures. Alternatives 1, 3 and 4 would also offer new opportunities for fishing along Shaver's Fork.

- <u>Adverse Impacts Which Cannot Be Avoided</u>

  - The great majority of increased tourism and recreation volume would occur during current low periods. However, higher volume may also be expected during peak periods (summer and fall foliage weekends) which could create or intensify congestion at those times.

  - Larger tourism volume would also increase requirements for cleanup of human and automobile pollutants and litter.

  - The opening of previously inaccessible back country would introduce human activity into areas formerly in an undeveloped condition.

  - Alternatives 1, 3 and 4 would require taking of Snowshoe Company property which could constrain development of the golf course, a new ski area and associated condominium development. Alternative 2 would also constrain development of the proposed golf course.

- <u>Relationship of local short-term uses to long-range productivity</u>

  - All benefits and adverse effects on tourism and recreation would occur in the longer term; none in the short-range construction period.

  - Long-term benefits could be significantly magnified if the road between Snowshoe and Cass were improved and paved to allow easy access and communications for tourists and local business interests.

- <u>Irreversible and irretrievable commitments of resources</u>

  - Any commitment of Snowshoe property to the HSH would be essentially irreversible and irretrievable.

  - Once access is provided to previously inaccessible areas, return to an undeveloped condition is not easily achieved.

2. Coal Production

a. Introduction

As discussed in Section II, coal deposits are located in the northern half of the study area and are being actively mined. Both strip and deep mining techniques are currently being utilized by a number of operators who hold lease arrangements with the Mower Lumber Company. Preliminary 1980 coal production figures indicate that approximately of the 96 million tons* of coal reserves in the area, 445,000 tons were mined that year. Strip mining accounted for about three-quarters of the tonnage.

Unmined reserves are located on the knobs along Cheat Mountain, such as Crouch, Beech Flat, Ward and Snyder Knobs, and on the knobs along Back Allegheny Mountain between the Cass Scenic Railroad and U.S. Route 250.

Currently, the primary coal haul roads extend southward into the project area from U.S. Route 250. One begins near Cromer Top and services an active strip mine and deep mine on Barton Knob. Two other main coal haul roads begin near Cheat Bridge and extend southward along the east and west sides of the Shavers Fork. The one on the west side services an active strip mine and a deep mine complex near Barton Knob, two extensive active strip mines northeast and southeast of Crouch Knob, and one coal loading facility. The haul road on the east side of the Shavers Fork serves a coal processing and loading facility near Cheat Bridge and a disposal area just south of Fish Hatchery Run.

b. No-Build Alternative

With the no-build alternative, coal production is likely to continue at the current (1980) rate of approximately 500,000 tons a year. Mining would occur in previous and existing mining areas as well as on additional knobs along Cheat and Back Allegheny Mountains. Mining and reclamation activities would be closely regulated by the West Virginia Department of Natural Resources. The amount of land in the mineral extraction category would gradually increase over the next fifteen years.

c. Build Alternatives

As indicated in Section IV, if a build alternative is pursued, acquisition of scenic easements and management of a selected scenic corridor would preclude most mining activity as it is presently conducted. Specifically within retention (R) easement areas, only deep mining activity would be allowed if adequately camouflaged from the scenic highway and recreation areas. Haul roads would be permitted only if they would follow the natural land contours and would be limited in width so they would not be visually evident from the highway. Within the partial retention (PR) easement areas, deep mines and hauls roads would be permitted only if they remain visually

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*This is an estimate for reserves in four of the five seams located in the area (See Section II.B.6.a).

subordinate to the characteristic landscape. The provisions of Public Law 93-87 would not permit use of the highway by commercial vehicles including those serving the area's coal industry. For this reason and to avoid safety hazards, at-grade intersections between the scenic highway and coal haul roads would not be allowed.

Easement acquisition programs for Alternatives 1 and 2 on Cheat Mountain include the least amount of land containing coal reserves, and avoid most coal reserves along Back Allegheny Mountain. Alternative 3 avoids a portion of Cheat Mountain from north of Snyder Knob to Beech Flat Knob. Alternative 4 avoids much of the coal deposits along Back Allegheny Mountain south and east of First Fork and in the headwaters area of Second Fork. Alternative 4 would have an additional effect on the recovery of coal reserves because of its proximity to the two main haul roads along the Shavers Fork. Although Alternatives 1 and 2 affect the least amount of land containing coal deposits, it does not necessarily follow that these alternatives affect the least amount of coal reserves. The actual quantity of coal in any particular area of the study area is not known.

Given the restrictions that would be placed on coal mining activity with implementation of any of the build alternatives, it is highly probable that the mine operators and land owner would choose to strip mine economically recoverable coal reserves from the areas that would be affected by a particular build alternative, between the time the decision is made to build the extension and the time the extension is completed. An accelerated mining program would have to be undertaken to recover as much coal as could be extracted through short-term mining methods. Strict enforcement of Office of Surface Mining Regulations would be essential to an environmentally sound mining operation of this magnitude. Coordination among the Forest Service, Office of Surface Mining, Department of Natural Resources, mine operators, and land owners is essential to the economically and environmentally sound removal of coal from the affected area. Accelerated removal of reserves outside the scenic corridor that must be hauled through the corridor should also be considered since the construction of haul roads within scenic easement areas would be strictly regulated.

In summary, the selection of a build alternative may induce property owners and miners to accelerate the recovery of coal within the chosen corridor, with the purpose of removing as much of the resource as possible before the extension of the highway is completed. In this case, coal production would greatly exceed the 500,000 ton annual production estimate forecast for the no-build alternative, at least through 1995. If this accelerated mining activity develops, the Forest Service may have to moderately increase its reclamation program over that described in Section IV. Mined lands would temporarily be placed in the mineral extraction category and later would become open space/recreational land uses as the scenic highway is implemented.

Even if an accelerated recovery of affected reserves would occur with the selection of a build alternative, many of the area's reserves that cannot be economically removed with short-term extraction methods would remain underground. After the extension is constructed, recovery of these

reserves would be more costly because of the scenic easement program. Therefore, in the long-term, implementation of a build alternative would inhibit the mining of remaining reserves and thus reduce the potential total coal output of the area.

3. Timber Production

The acquisition programs and recommendations which have been set out in this report have varying degrees of economic impact upon the timber resources.

The fee simple acquisition for the construction corridor of a selected build alternative would be the only area totally removed from any future consideration for timber production. The various alternatives result in a taking of private land ranging from 3,996 acres to 4,796 acres. This represents a growth potential of approximately 650MBF* annually, not a significant figure in terms of the available timber within economic reach of sawmills operating in this area. Any additional fee acquisition that may occur outside of the 1,000 feet construction corridor, as the result of the acquisition negotiation process or of the land locking of parcels, would be managed according to the established visual quality objectives.

Within areas designated for easement acquisition, timber management would be directed by two visual quality objectives: 1) retention which allows management activities that are not visually evident, and 2) partial retention which requires that management activities remain visually subordinate to the characteristic landscape.

Retention generally precludes clearcutting but allows other harvesting activities such as shelterwood or partial cuts which do not introduce form, line, color, or texture changes. The greatest impact of the management objective would be upon the management of pure red spruce stands. Partial cuts in pure spruce stands expose the residual stands to windthrow, ice and snow damage. The necessity to limit management activity to partial cuts such as shelterwood results in higher management and logging costs. A multi-cut shelterwood would expose the owner to greater risk in the stand management, reduce stumpage values due to higher logging costs per unit removed, and cause higher forest management costs due to the more intense nature of the harvesting system. The negative impact on spruce management operations would also be felt by several rustic fence mills which are completely dependent upon the red spruce stands in the Shavers Fork drainage area.

Management of the various hardwood types occuring in retention areas would also be negatively affected by the build alternatives. Since only shelterwood or partial cuts would be allowed, longer rotation periods would result. Longer rotations would reduce landowner returns on investment due to the longer carrying periods. To meet the retention objective it would be necessary to cut lower than normal volumes and to visit stands more frequently. Within the Shavers Fork drainage area this practice would increase operating costs because of the need for increased sediment control measures to maintain a high water quality level. These costs would be partially offset by the better log quality resulting from longer rotation periods.

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*MBF =Thousand Board Feet

Timber management activities within partial retention areas would be more flexible than those within retention areas and could result in elements of form, line, or texture which are evident but visually subordinate to the characteristic landscape. Irregularly shaped clear-cuts and partial regeneration cuts, such as shelterwood, would be permitted. Roads and skid trails from logging areas would be allowed but would have to be visually subordinate to the characteristic landscape.

Restrictions on commercial hauling on the Highland Scenic Highway and on haul roads within the easement areas would also unfavorably impact timber operations. These restrictions would be particularly acute for those areas which would be outside of the areas controlled by easements but would require hauling on roads located within the easement areas.

Management activity in partial retention areas would result in longer than normal rotation periods, increased carrying and logging costs, higher management costs, and removal of smaller than normal volumes. These requirements would tend to increase timber management costs but not to the extent that costs would be increased within retention areas.

Within the easement areas, the requirement to lengthen rotations and reduce cutting levels would result in reduced harvest levels for 20 years. After 20 years, timber harvest would not be impacted. Impacts associated with reduced harvests in the Shavers Fork drainage area would be the most significant because of the current level of dependency upon red spruce in this area.

Estimated reductions in sawtimber outputs are shown in Table 52. Alternative 3 would cause the greatest loss (2.350 MMBF/year),*and Alternative 2 would cause the least (1.20 MMBF/year).

4. Grazing Lands

Grazing lands located in the southern and southeastern portions of the project area would be affected by all four build alternatives. Specifically, Segments A, B, and D would cause some loss of pasture on private and Federally owned lands, however, these losses would be minimal. Only a fifty foot band of acreage would be lost where alternatives traverse grazing lands. Grazing activity outside of this band could continue since this land use would be compatible with visual quality objectives established for the four build alternatives. Actual loss of potentially useful grazing acreage is given below.

Alternative Alignment	Segment	Highway Length Affecting Grazing Lands (feet)	Average Width* Taken for Highway Use (feet)	Loss of Grazing Lands (acres)
1, 3, 4	A, B	7,200	50	8.3
2	A, D	17,200	50	19.7

*Width includes pavement, shoulder, and safety margin.

Although demand for livestock grazing of Forest Service lands is reportedly strong and is expected to exceed the supply that can be made available through 1985, the amount of land that would be removed from production is too small to significantly affect local farming operations.

*MMBF = Million Board Feet

TABLE 52

PROJECTED REDUCTIONS IN SAWTIMBER OUTPUTS

Alternative	REDUCTION Percent	REDUCTION MMBF/Year
ALTERNATIVE 1		
Within Shavers Fork Watershed	10	1.00
Scenic Corridor Outside Shavers Fork	5	.25
Total		1.25
ALTERNATIVE 2		
Within Shavers Fork Watershed	7	0.7
Scenic Corridor Outside Shavers Fork	10	.50
Total		1.20
ALTERNATIVE 3		
Within Shavers Fork Watershed	20	2.00
Scenic Corridor Outside Shavers Fork	7	0.35
Total		2.35
ALTERNATIVE 4		
Within Shavers Fork Watershed	15	1.50
Scenic Corridor Outside Shavers Fork	7	0.35
Total		1.85

The production within the Shavers Fork watershed is based on the current estimated annual production of 10 MMBF. Within the scenic corridor outside of the Shavers Fork watershed, an annual production of 5.0 MMBF has been assumed. The production rate is normally 250 BF per acre per year. The percentage of reduction is based on reductions in annual production due to visual management restrictions within the scenic corridors.

In order to maintain effective utilization of grazing lands divided by the highway, livestock crossings would be permitted, either at grade or beneath the highway, although this could invoke some inconvenience to farmers and motorists alike.

Because of the vehicular restrictions set by the 1973 Highways Act (P.L. 93-87), the transport of livestock on the Highland Scenic Highway would be prohibited, however, existing roads used for such purposes within the project area would be maintained.

5. Employment and Local Revenue

The objective of this section is to examine how and to what extent the various build alternatives for the Highland Scenic Highway extension would affect the local and regional economy in terms of jobs, income, and government revenues. The analysis focuses on several areas of potential economic impact, including (1) changes identified above with respect to tourism, coal production, timber production, and grazing; (2) construction and maintenance of the highway and associated recreational facilities; (3) the acquisition of privately-owned land by the U. S. Government; and (4) changes in the quality of life for local residents.

a. Tourism

Completion of any of the four proposed build alternatives for the Highland Scenic Highway extension could produce some $1,650,000 per year in additional visitor spending within or near the study area (see Section D.1. above). This compares with an estimated $33 million spent by visitors to the two Highland Scenic Highway counties in 1978, and would represent a far more significant share of visitor expenditures in Pocahontas County.

Assuming that it takes about $20,000 in expenditures to create a job in tourism, as is the national average excepting transportation, this anticipated level of additional spending would create 82.5 new year-round equivalent jobs. Most of the jobs would be in the services and retail trade sectors, where wages now average about $8,000 per year.*

Based on statewide data showing that every $100 spent by visitors in West Virginia generates another $34 in indirect sales, the total impact of tourism growth attributable to the highway extension could exceed $2.2 million annually. State, gasoline, sales, B & O, and personal income taxes generated by such sales would amount to about $150,000 if paid at 1980 rates.

b. Coal Production

Some 216,000 tons of coal, representing nearly 20 percent of Randolph County's total production, were mined within the study area in 1979. Preliminary estimates for 1980 indicate that output more than doubled to 445,000 tons, due entirely to an increase in surface mining activity which accounted for over 75 percent of the total volume (341,000 tons). Based on

*While this is somewhat higher than travel industry wage figures reported by the West Virginia Governor's Office of Economic and Community Development for counties in the Potomac Highlands Travel Council, it is well below the average paid at the Snowshoe ski resort in 1979.

statewide worker productivity figures of 991 tons and 3,569 tons per man-year for underground and surface mines respectively, approximately 201 man-years of direct labor were employed in study area mining operations last year. Indirect employment in coal processing, trucking, and related industries is estimated by a local mining company at one additional job opportunity for every man-year expended in the mines.

As discussed in Section D.2. above, all four build alternatives for the Highland Scenic Highway extension could have serious implications for the mining industry, whether through prohibition of surface mining in easement areas or through the imposition of landscape and water quality management systems which would increase the cost of mining operations. However, with the cooperation of the mine owners, it may well be possible to accelerate mining operations to remove economically-recoverable reserves from impacted areas before the restrictions take effect, provided market conditions remain favorable throughout the proposed recovery period. The consequences of accelerated mining activity in the study area would be beneficial for the local economy, generating direct and indirect employment for approximately 500 full-time workers if output levels are set at 500,000 tons per year and if the 1980 surface:underground production ratio continues. Since much of the infrastructure (access roads, processing facilities, etc.) needed to support this level of production is already in place, little additional investment should be required on the part of local mining companies.

c. Timber Production

Each of the four build alternatives would reduce the output of sawtimber in the study area, by estimated amounts ranging from 950,000 to 2.3 million board feet per year (see Section D.3.). Alternative 3 would have the most significant impact on harvest levels, as it includes in its fee and easement acquisition programs the greatest percentage of land in the Shavers Fork watershed currently under timber management.

As discussed in Section D.3. above, local timber companies could also expect some increases in investment and production costs to result from each build alternative. Although in the long-run these increases may be offset by higher timber values, in the short-run they may make it unprofitable to harvest the land at all. Detailed analysis of the economics of the local timber industry is beyond the scope of this report; however, many small U.S. timber companies operate on very narrow profit margins imposed by regional price ceilings for their products and can be driven out of the market by even minor increases in production costs.

Any reduction in annual timber production on lands within the study area would be felt directly by the sawmills and rustic fencing firms that rely on these lands for their raw materials. At least seven local mills utilize timber harvested in the Shavers Fork watershed on a regular basis, and four mills are entirely dependent on this source. Based on employment and dependency information reported by these mills, it is estimated that the current annual timber cut in the study area supports between 110 and 125 full-time processing jobs.

Local demand for sawtimber reportedly is high and exceeds the potential yield and programmed harvests for Federally-owned lands on the Monongahela National Forest.[1] If annual sawtimber output levels on privately-owned lands are reduced by the amounts indicated in Section D.3. (8-16 percent), there could well be a commensurate reduction in employment levels at the mills. In the case of Alternative 3, this could mean a loss of 18-20 jobs paying an average of $10,000-$12,000 a year at prevailing wage rates (Table 53). Cutbacks in industries with forward and backward linkages to the mills, including logging contractors, truckers, dimension plants, and wood products firms, could eliminate an equivalent number of local jobs unless alternative sources of sawtimber supply are made available.

d. Grazing

Construction of Alternatives 1, 3, or 4 would affect 8.3 acres of grazing land; Alternative 2 would affect 19.7 acres (Section D.4. above). About five acres of this pasture is currently being managed by the Forest Service as grazing allotments. The Forest Service estimates resulting losses for these five acres, in terms of annual usage and grazing permit fees, at 10 animal-unit months* and $16 respectively. Loss to private owners cannot be quantified. Although demand for livestock grazing on the Forest reportedly is strong and is expected to exceed the supply that can be made available through 1985, the amount of land that would be removed from production is too small to have any measurable effects on local livestock farming operations.

e. Highway Construction and Maintenance

Construction costs of the four build alternatives and their associated recreation programs have been estimated at $1,008,000 to $1,173,000 per mile in 1980 dollars. The direct labor component can be expected to average $350,300 to $410,700 per mile, or about 35 percent of total costs. Thus, assuming that the project is completed in sections of approximately equal length annually per 35-week (April-October) season, it could generate the equivalent of 77 to 89 full-time construction jobs, paying an average wage of $500/week, over the 10 year construction period. Alternative 1, the most expensive of the four alternatives to construct and also the one requiring the largest volume of excavation, would likely create the most employment.

Experience on comparable highway projects undertaken near the study area has shown that, while certain engineering, contract management, and speciality skills such as guardrail installation must be brought in from other parts of West Virginia or outside the state, construction crews are composed primarily of local residents. Contractors responsible for the seven mile section of the Highland Scenic Highway immediately southwest of U.S. Route 219 estimate that 70 to 80 percent of their workers came from Pocahontas and adjacent counties (Randolph, Greenbrier, and Nicholas). Approximately two-thirds of this workforce consisted of individuals skilled or semi-skilled in the construction trades, with the balance being made up of unemployed miners, forest industry employees, or other temporary job-seekers. In the case of Pocahontas County alone, the project has accounted for nearly half of all construction industry employment and over $1 million in wage payments to county residents during the past three years.

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*Two head of adult cattle x five months grazing season

TABLE 53

ESTIMATED DIRECT IMPACT OF HSH BUILD ALTERNATIVES
ON TIMBER - RELATED EMPLOYMENT

Alternative	Reduction (%) 1/	Employment Reduction (FTE Jobs) Mills 2/	Other 3/	Total
1	8	9-10	9-10	18-20
2	8	9-10	9-10	18-20
3	16	18-20	18-20	36-40
4	12	13-15	13-15	26-30

1/ Includes lands in corridor and Shavers Fork (See Section 2.c.).

2/ Based on estimated number of milling jobs supported by sawtimber taken from the study area.

3/ Based on ratio of sawmill to other lumber and wood products industry employment in Randolph and Pocahontas Counties, plus allowance for jobs in the transportation sector. Excludes jobs in the construction and trade sectors which may be generated by timber sales.

Some of the materials and supplies used in highway construction can also be locally procured. On the contract referenced above, expenditures for fuel, tools, spare parts, and various construction materials (including 1,000 feet of split rail fencing) purchased from local businesses amounted to about $100,000 a year. In addition, the principal sub-contractor on the project, a local construction company, processed some $300,000 worth of its paving materials at the company-owned limestone rock quarry in Pocahontas County.

Similar expenditure patterns could be expected to prevail for the extension of the Highland Scenic Highway, regardless of the alternative selected. Depending on the highway design specifications and the number of concrete structures involved, the project could also generate demand for ready-mix concrete and other structural materials supplied by local firms. Finally, it is possible that local construction companies would be successful in bidding for portions of future highway projects that have been held in the past by outside firms. This could have a significant impact on the local economy, not only in the construction sector, but in the banking, insurance, and trade sectors as well.

Once the project is completed, it would provide a limited amount of employment for highway maintenance crews--on the order of two man-years per year based on U.S. Forest Service estimates and assuming the highway is closed during the winter months. If the highway were kept open year-round, this figure would probably rise to three man-years to cover ice control and snow removal. An additional two man-years of employment would be generated by the need to maintain the overlooks, picnic areas, and other facilities included in the recreation program for each alternative. In summary, the highway would create from four to five full-time equivalent jobs paying on an average salary of $13,000 per year on a permanent basis.

Finally, as during the construction phase, it is likely that some local materials (particularly limestone rock) would be purchased in connection with these highway maintenance activities. The value of such purchases to the area's economy may be roughly estimated at $10,500 to $12,000 per year, depending on the length of the alternative selected. This would represent about ten percent of total highway maintenance costs calculated at $3,000/mile, or slightly higher than the current West Virginia Department of Highways' average for state-maintained roads in Pocahontas County.

f. Land Acquisition

The fee acquisition programs proposed for the various build alternatives would remove between 4,802 and 5,509 acres of land from private ownership and, by so doing, reduce the property tax base in Randolph and Pocahontas Counties. An additional 31,881 to 44,739 acres, while being allowed to remain in private hands, would be covered by scenic easements

limiting their development potential. However, since neither county offers tax concessions on easement property, this component of the acquisition programs would have no immediate impact on local tax receipts, although it could have a moderating effect on assessment values in the future.

Table 54 provides estimates of current tax levies on land recommended for fee acquisition under Alternatives 1, 2, 3, and 4. In Randolph County, where the last comprehensive assessment was conducted by the State in 1965, valuations placed on undeveloped property south of U.S. Route 250 are extremely low, averaging about $8/acre. Except for a few parcels along the Segment C corridor (Alternatives 1 and 2), all of the land in this area is owned by the Mower Lumber Company and taxed at the Class III rate of $2.45 per $100 of assessed valuation. Total estimated tax receipts, which reflect the low assessment values and differ only in accordance with the amount of land involved, range from $311 (Alternative 3) to $503 (Alternative 2) per year. The estimated annual tax per acre of $0.196 is well below the FY 1980 PILT payment level of $0.738/acre, indicating that, under its current tax structure, Randolph County would experience a net gain in total revenues from the transfer of privately-owned property to the Federal Government.

In Pocahontas County, most of the land included in the fee acquisition programs was last assessed in 1975 at values ranging between $25 and $100 per acre. The estimates in Table 54 are based on an assumed average valuation of $60/acre and FY 1980 tax rates on Class II (owner-occupied residential property and farms) and Class III property. It is also assumed that 50 percent of all privately-held acreage along corridor Segments A and D qualifies for the Class II rate of $0.75 per $100, even though no buildings or subdivided lots would be removed from private ownership. This explains the lower average tax applied to the acquisition program for Alternative 2, which involves a proportionately greater amount of residential and agricultural land. The majority of the acreage needed to build the other three alternatives would be taken from undeveloped Snowshoe and Mower Lumber Company holdings where the Class III tax rate of $1.50 per $100 applies. Alternative 2 would have the most significant impact on the Pocahontas County tax base, removing some 3,923 acres from the tax rolls and reducing property tax revenues by about $2,800 per year. However, this represents only a small fraction (about 3/10ths of one percent in FY 1979) of County property tax receipts, and would be more than covered by PILT payments if made at current levels.

On balance and under the existing structure of taxation, Randolph and Pocahontas Counties would benefit from the proposed acquisition programs to varying degrees. In addition to the expected increase in PILT receipts, which would compensate for any loss in property tax revenues, both counties can anticipate some appreciation in land values in the vicinity of the highway corridor that would ultimately be reflected in the tax base. These benefits could well be negated, however, by future

TABLE 54

ESTIMATED IMPACT OF RECOMMENDED FEE ACQUISITION PROGRAMS ON LOCAL GOVERNMENT REVENUES

Alternative	County	Acres	Average Tax/ acre 1/	Annual Tax Levied	Est. PILT Receipts 2/	Net Gain
1	Randolph	2,324	.196	$ 456	$1,716	$1,260
	Pocahontas	2,572	.705	1,813	1,898	85
	Combined Total	4,897	-	2,269	3,614	1,345
2	Randolph	2,566	.196	503	1,894	1,391
	Pocahontas	2,236	.630	1,409	1,650	241
	Combined Total	4,802	-	1,912	3,545	1,632
3	Randolph	1,586	.196	311	1,170	859
	Pocahontas	3,923	.720	2,825	2,895	70
	Combined Total	5,509	-	3,136	4,065	929
4	Randolph	2,196	.196	430	1,621	1,191
	Pocahontas	2,608	.705	1,837	1,925	88
	Combined Total	4,804	-	2,267	3,546	1,279

1/ Average assessed valuation of $8/acre for Randolph County, $60/acre for Pocahontas County, multiplied by FY 1980 tax rates. Figures for Pocahontas County are weighted to reflect differences in Class II and Class III valuations.

2/ At FY 1980 payment levels of $0.738/acre ($0.75/acre x .985 percent).

increases in local tax rates (including the imposition of special levies by referenda) and/or by land value reassessments such as the State is expected to conduct in Randolph County within the next two years. They could also be negated by any reduction in the annual level of PILT funding which is subject to Congressional appropriation.

g. Changes in the Quality of Life

Extension of the Highland Scenic Highway to U.S. Route 250 could indirectly affect the local economy by facilitating automobile travel for residents and commuters and by providing better access to recreational resources on the Monongahela National Forest. This would be in consonance with existing development strategies for Randolph and Pocahontas Counties, which maintain that improvements in the quality of life for local residents can be an important impetus to economic growth and the attraction of new industries.

h. Summary and Conclusions

The Highland Scenic Highway extension should benefit the economy of the study region in several respects. Expected increases in visitor spending due to the Highway should stimulate the tourism industry, creating new business and job opportunities and generating additional tax revenues for State and local use. Similar economic opportunities should be derived from activity associated with construction and maintenance of the highway project. Benefits vis-a-vis the no-build condition should be comparable in magnitude for all four build alternatives.

Short-term effects of the highway extension on Pocahontas and Randolph County government revenues are also seen as beneficial, although the margin of benefit would be relatively small and highly sensitive to future changes in land values, tax rates, and PILT payment authorizations. There would be little if any cutback in Forest Service "25 percent fund" distributions to the counties in light of the negligible amount of acreage that would need to be taken out of grazing or other forms of permit management to accommodate the Highway.

Restrictions on coal and timber production implicit in the proposed land management system for each build alternative could adversely affect the mining and forestry/forest products sectors, both important elements of the local economy. Potential losses of mining-related jobs and income could be avoided or minimized to the extent that the impacted coal reserves could be recovered during the highway construction phase. The severity of the impact on timber-based industries would depend on the availability of alternate sources of sawtimber supply and on the location of the Highway corridor: Alternative 3 would have the most significant short-term effect on industry employment levels whereas Alternative 1 would have the least significant effect. These effects would be felt during a 20-year period of adjustment in rotation lengths and production volumes, after which the outlook for the forestry/forest products sector should once again improve.

The land, labor, and capital allocated to the Highland Scenic Highway extension would represent an irretrievable commitment of these economic resources. Management restrictions foreclosing certain kinds of development options in scenic easement areas may also reduce the long-term economic value of the resource base, particularly with respect to coal. The quality of the timber cut, on the other hand, may well be enhanced as a result of the extended rotation periods required for landscape management. Elements of the local economy dependent on the area's tourism/recreation resources would likewise benefit from protective measures designed to maintain these resources' value for future generations.

6. Production and Consumption of Energy Resources

An analysis has been performed to determine possible effects that the proposed extension of the Highland Scenic Highway may have with respect to the production and consumption of energy. This analysis was performed in accordance with procedures described in the report prepared for Project 20-7, Task 8, of the National Cooperative Highway Research Program (NCHRP).[67] These procedures are currently accepted as standard methods for transportation energy analyses.

In this analysis, transportation-related energy has been considered in the two main categories: direct and indirect energy. Direct energy is defined as the energy consumed in the actual propulsive effort of vehicles, in this case, the thermal value of the fuel consumed for the operation of motor vehicles. Indirect energy is defined as all remaining energy necessary to bring the transportation system into being and to retain it in operation. Indirect energy is divided into two general sub categories: central energy use and peripheral energy change. Central energy use encompasses all energy resources used indirectly in building and operating the transportation system. In this analysis, energy resources necessary to construct each of the proposed alternatives have been quantified as have the indirect energy to manufacture and maintain the vehicles operated on these roadways and to also maintain the roadways.

Peripheral energy change occurs with the implementation of transportation projects because of the potential effects the transportation system may have on energy use and availability in the area it serves. These energy resources, however, are not used in any manner by the transportation system itself. There are peripheral energy changes which would potentially occur with each of the proposed alternatives for the extension of the Highland Scenic Highway. These include the implementation of the recreational development opportunities to be undertaken with each build alternative together with other privately-sponsored development which may occur because of the extension of the scenic highway. Effects on the mining operations in the Upper Shavers Fork watershed also would be considered peripheral energy change because of the proposed highway's effects on this land as an energy source. Restrictions under the proposed land acquisition programs for the alternatives would also have ramifications within the area of peripheral energy change. These effects have not been quantified in the present analysis, but are recognized as being of significance to the consideration of energy production and consumption.

The no-build alternative would have significantly different effects on energy than the build alternatives usage within the study area. For the analysis, the portion of U.S. Route 219 from the intersection with the Highland Scenic Highway at the terminus of the constructed section to Huttonsville has been analyzed. This energy analysis has considered the effects both for the build and no-build alternatives on this two-highway system, composed of the Highland Scenic Highway and U.S. Route 219.

The analysis of this system is considered to be sufficient to demonstrate comparatively the dynamics of the effects to be anticipated over the entire regional transportation system. It should be noted, however, that the energy effects on the entire affected roadway system would extend beyond the two highway sections considered in this analysis. Because the build alternatives result in a decrease in energy use on existing roadways, the overall difference in energy use between the build and no-build alternatives would be somewhat less if other sections of the local roadway network were considered. Since the Highland Scenic Highway is restricted to automobiles only, all truck traffic has been assigned to U.S. Route 219 under both the build and no-build alternatives.

a. Direct Energy Usage

Direct energy usage has been estimated in the form of the thermal energy equivalency of the fuel consumed to operate vehicles on the roadways analyzed. These amounts of energy have been quantified in terms of British Thermal Units (BTU). For the build alternatives, a 30 mph operating speed has been assumed under free-flow conditions. For the traffic remaining on U.S. Route 219 for both the build and no-build alternatives, a 45 mph operating speed has been assumed under free-flow conditions. Both roadways have been assumed to be in adequate structural condition and to be adequately maintained, and no corrections have been applied for roadway conditions in the energy calculations for any roadway.

The direct energy consumption by vehicles operated on the roadways has been estimated using the ADT traffic for 1985 and 2005 with automobiles only for the alternatives for the construction of the Highland Scenic Highway. For the paralleling section of U.S. Route 219, the volumes of medium and heavy trucks will be the same under both build and no-build conditions, with differentials only in the automobile volumes.

The adjustments required for effects of grade and curvature were developed and applied to each of the build alternatives. Since this information was not readily available for the section of U.S. Route 219 analyzed, assumptions were made to provide adjustments for grade and curvature.

Direct energy use on an annual basis for each of the alternatives considered are summarized on Table 55.

b. Indirect Energy Usage

Indirect energy usage related to the manufacture and maintenance of the vehicles operated on the roadways included in the analysis and for the roadways themselves have also been estimated. These estimates on an annual basis are summarized on Table 56.

TABLE 55
DIRECT ENERGY USAGE
($X\ 10^6$ BTU)

Alternative	1985	2005
1. Highland Scenic Highway	70,592	86,817
U.S. Route 219	59,550	81,300
Total	130,142	168,117
2. Highland Scenic Highway	65,226	80,248
U.S. Route 219	59,550	81,300
Total	124,776	161,548
3. Highland Scenic Highway	76,672	94,353
U.S. Route 219	59,550	81,300
Total	136,222	175,653
4. Highland Scenic Highway	60,854	75,005
U.S. Route 219	59,550	81,300
Total	120,404	156,305
No-Build Alternative		
U.S. Route 219	87,207	115,656

TABLE 56

INDIRECT OPERATIONAL ENERGY USAGE
(X 10^6 BTU)

Alternative	1985	2005
1. Highland Scenic Highway		
Vehicle Manufact. & Maint.	62,631	96,016
Roadway Maint.	10,428	10,428
U.S. Route 219		
Vehicle Manufact. & Maint.	44,756	68,918
Roadway Maint.	10,211	10,211
Total	128,026	185,573
2. Highland Scenic Highway		
Vehicle Manufact. & Maint.	56,519	87,475
Roadway Maint.	9,434	9,434
U.S. Route 219		
Vehicle Manufact. & Maint.	44,756	68,918
Roadway Maint.	10,211	10,211
Total	120,920	176,038
3. Highland Scenic Highway		
Vehicle Manufact. & Maint.	64,164	98,953
Roadway Maint.	10,677	10,677
U.S. Route 219		
Vehicle Manufact. & Maint.	44,756	68,918
Roadway Maint.	10,211	10,211
Total	129,808	188,759
4. Highland Scenic Highway		
Vehicle Manufact. & Maint.	55,827	85,642
Roadway Maint.	9,321	9,321
U.S. Route 219		
Vehicle Manufact. & Maint.	44,756	68,918
Roadway Maint.	10,211	10,211
Total	120,115	174,092
5. No-Build Alternative		
U.S. Route 219		
Vehicle Manufact. & Maint.	67,338	103,985
Roadway Maint.	10,211	10,211
Total	77,549	114,196

c. Indirect Energy Usage for Roadway Construction

Estimates of the energy required for the construction of each of the build alternatives have been developed. The estimates of energy were derived by the application of typical amounts of energy consumed in construction per dollar of construction cost. As the standard amounts of construction energy per construction dollar were established in years other (1973-74) than the year for which the construction costs were estimated (1980), the construction costs were appropriately adjusted before applying the energy conversion factor. The estimated amounts of construction energy usage, as a result, are considered to be constant over the construction period regardless of changes due to the fluctation of the value of the dollar. This assumption, of course, does not consider possible measures to perform construction by more energy-efficient procedures which would appear to be desirable in the future. In the analysis, no consideration has been given to the energy required to reconstruct or upgrade sections of U.S. Route 219 although it is likely that under the no-build alternative, improvements of U.S. Route 219 would be necessary at an earlier date then under the build alternatives. Construction of proposed overlooks and picnic areas have also been omitted for the build alternatives.

Typical energy equivalents (in BTU) have been applied to the construction costs of three classes of construction for each build alternative. These are roadway construction, structural construction and landscaping. The results of this analysis are show on Table 57. Estimates of the total construction energy and the annual construction energy, assuming a ten year construction period, i.e., 5.0% of the overall construction energy, are shown on this table. Assuming the useful life of roadway to be fifty (50) years, the indirect energy consumption required for the construction of each alternative has been prorated over this fifty year period. The prorated annual energy consumption is expressed both in BTU and equivalent barrels of crude oil on Table 57.

d. Comparison of Annual Energy Consumption

For purposes of comparing the annual energy consumption of the proposed alternatives considered in the study, an overall summarization of direct and indirect energy for the year 2005 is shown on Table 58. The year 2005 is selected for this analysis as it is more likely that construction of the build alternatives would be completed within this time frame and the highway would then be realistically available to accommodate the traffic for which energy projections were made. As the projected traffic has been increased on annual basis, this would also present the worst-case condition projected under the parameters of the study.

Based on this analysis, each of the build alternatives are within approximately 10% of each other in the consumption of the energy required to construct and maintain the proposed extension of the Highland Scenic Highway. It is to be anticipated, however, that the annual energy consumption for transportation within the study area would be increased in the magnitude of 27,500 equivalent barrels of crude oil annually (Alternative 3) to 21,400 equivalent barrels of crude oil annually (Alternative 4) when the effect of construction energy is considered. Without the effect of energy consumed in construction, the increase in transportation energy usage would remain with range of 23,200 equivalent barrels of crude oil annually (Alternative 3) to 17,400 equivalent barrels of crude oil annually (Alternative 4). It should be noted, however, as previously explained, this impact is overestimated because the analysis is limited to consideration of only two highway sections the Highland Scenic Highway and U.S. Route 219. The actual impact would be somewhat less.

TABLE 57

CONSTRUCTION ENERGY USAGE

Alternative	Total Construction Energy Consumption $\times 10^6$ BTU	Total Construction Energy Consumption Equivalent BBL. of Cr. Oil	Annual Construction Energy Consumption $\times 10^6$ BTU	Annual Construction Energy Consumption Equivalent BBL. of Cr. Oil
1	1,394,010	240,000	139,400	24,000
2	1,293,630	223,000	129,360	22,300
3	1,243,630	214,000	124,360	21,400
4	1,160,200	200,000	116,020	20,000

Alternative	Annual Construction Energy Consumption Prorated Over Life of Project (50 Years) $\times 10^6$ BTU	Equivalent BBL. of Cr. Oil
1	27,880	4,800
2	25,873	4,460
3	24,873	4,280
4	23,204	4,000

TABLE 58

OVERALL ANNUAL ENERGY USAGE FOR THE YEAR 2005 ($\times 10^6$ BTU)

Energy Usage	ALTERNATIVE 1	2	3	4	No-Build
Direct Energy -Veh. Fuel	168,117	161,548	175,653	156,305	115,656
Indirect Oper. Energy	185,573	176,038	188,759	174,092	114,196
Construction Energy	27,880	25,873	24,873	23,204	-
Total Energy	381,570	363,459	389,285	353,601	229,852
BBL. Cr. Oil/Day	180	172	184	167	108

7. Benefit/Cost Analysis

Many of the benefits and costs associated with the proposed action cannot be clearly measured quantitatively. Most of the projected adverse environmental effects cannot be quantified, although in many cases the costs to provide mitigation measures can be estimated and can provide a reasonable basis for a comparative analysis. As a highway intended for recreational enjoyment and scenic viewing, many of the benefits perceived for the action also cannot be expressed in finite terms. There are, however, several identified benefits and costs of the proposed extension of the Highland Scenic Highway which can be expressed in monetary terms for comparison. Construction, engineering and property acquisition costs are readily identified and quantified. Many related economic benefits and costs can also be identified and quantified.

The analysis of benefits and costs associated with the proposed project has been projected over a twenty (20) year period (1985-2005) and discounts benefits and costs that accrue over the study period, expressing them in terms of present net worth. A four percent interest rate is used for discounting, with a ten (10) year construction period (1985-1995) assumed. Results of this analysis, shown in Table 59, is used for the comparison of the build alternatives. These results do not provide a convenient comparison between build alternatives and the no-build alternative as many of the benefits and costs associated with building the highway extend well beyond twenty years, and many of the benefits and costs would not accrue until the highway was constructed and open to traffic. In Table 59, indications are made of the periods, after the start of the proposed project, when benefits or costs may be expected to accrue.

Many of the benefits shown in Table 59 would accrue for the local region. The quantifiable benefits include those associated with income to the local economy from tourist expenditures and expenditures for labor and materials for the construction and maintenance of the proposed highway. Since the expenditures for materials and wages becomes disposable income for others, direct benefit values for wages for construction and maintenance employment and for construction and maintenance materials have been doubled to reflect the multiplier effect. A multiplier of 1.34, however, was used to reflect tourism expenditure benefits as it has been indicated, on a statewide basis, that for every $100 spent by visitors in West Virginia, another $34 is generated in indirect sales.

Values for the recreational benefits associated with the proposed build alternatives have also been projected for the benefit/cost analysis for these projections, benefit values for various recreational activities included in the U.S. Forest Service's Recommended Renewable Resources Program - 1980 Update[34] were used. Of the estimated 165,000 additional visitors anticipated to travel the Highland Scenic Highway annually, each is expected to provide one-half day recreation visitor day (RVD) use, or a total of 82,500 additional recreation visitor days annually, based for the recreational use data shown in Table 16, usages in the following categories are projected:

TABLE 59

BENEFIT/COST ANALYSIS

	Years	Present Net Worth* ($1,000) Alternative 1	2	3	4
Benefits:					
1. Tourism Expenditures & Related Indirect Sales	11-20	10,299	10,299	10,299	10,299
2. Construction Employment & Related Indirect Income	1-10	21,611	20,046	19,495	18,711
3. Maintenance Employment & Related Indirect Income	11-20	610	610	610	610
4. Construction Materials	1-10	5,627	5,380	5,491	5,237
5. Recreational Benefits	11-20	2,308	2,308	2,308	2,308
Total		40,455	38,643	38,203	37,165
Ranking		(1)	(2)	(3)	(4)
Costs:					
1. Construction, Engineering, Land Acquisition and Reclamation, Recreational Develop. & Mitigation	1-10	41,636	39,528	42,501	38,719
2. Employment Losses	1-20	2,558	2,558	5,295	3,903
3. Energy Consumption:					
Direct Fuel Consumption	11-20	7,316	7,026	7,648	6,796
Veh. Manufacture & Facility Maintenance	11-20	4,851	4,598	4,931	4,551
Construction Energy	1-10	5,825	5,411	5,194	4,852
Total		$62,186	$59,121	$65,569	$58,821
Ranking		(3)	(2)	(4)	(1)

Benefit/Cost Ratio:

Alternative	Ratio	Ranking
1	0.651	2
2	0.654	1
3	0.583	4
4	0.632	3

*Benefits and Costs have been discounted and expressed in terms of Present Net Worth. Study period = 1985-2005; construction period = 1985-1995.

Developed recreation use (auto-drive, scenery viewing, picnics, other):
30% or 24,750 RVD
Dispersed recreation use (camping, hiking, rock-climb):
44% or 36,300 RVD
Hunting: 14% or 36,300 RVD
Fishing: 12% or 9,900 RVD

For each of the recreation uses, the appropriate benefit value has been applied. The projected benefit value for the recreational uses associated with the proposed build alternatives is as follows:

Developed recreation use:	24,750 RVD x \$ 3.00/RVD =	\$ 74,250
Dispersed recreation use:	36,300 RVD x \$ 5.50/RVD =	\$199,650
Hunting:	11,550 RVD x \$10.50/RVD =	\$121,275
Fishing:	9,900 RVD x \$ 5.25/RVD =	\$ 51,975
Annual benefit value: recreation uses		\$447,150

Applying the indices suggested in the above reference, these recreation benefit values have been projected for the years, 1995 to 2005, representing the years in the analysis when these benefits would accrue. As each of the build alternatives are anticipated to accrue recreational benefits of approximately the same level, no differentiation has been made in the recreation benefit values for all four build alternatives.

Unlike most of the quantifiable benefits which are regional in nature, quantifiable costs, with the exception of employment losses, have national implications as the funding for the extension of the Highland Scenic Highway would be provided from federal highway trust funds. The quantifiable costs identified in Table 59 include the costs for engineering, land acquisition and reclamation, highway and recreation facilities construction, construction of mitigation measures, employment losses and energy consumption.

The benefit/cost ratios for the four build alternatives are presented in Table 59 and are as follows: Alternative 1, 0.651; Alternative 2, 0.654; Alternative 3, 0.583; and Alternative 4, 0.632. In terms of economic return based on the quantifiable benefits and costs, the build alternatives rank in the following order: first, Alternative 2; second, Alternative 1; third, Alternative 4; and fourth, Alternative 3.

E. IMPACTS ON RESOURCES

1. Visual

The characteristic landscapes through which the alternatives would pass are described in Section IV.B.5, which also discussed the capability of the landscapes near each build alternative segment to visually absorb the highway. Construction of any build alternative would introduce a strong linear element in any of the characterisitc landscapes. All of the characteristic landscapes along Alternative 4, the Shavers Fork Alternative, have relatively moderate capabilities of absorbing the highway. With the other three build alternatives, however, landscapes south of the Cheat and Back Allegheny Mountain riges have a moderate capability to absorb the highway, but the landscape containing these ridges have a weak capability to absorb the highway.

The view of landscapes from existing roads and recreation areas (Table 60) would be negatively affected by the introduction of the highway. This affect would be greatest if the highway is located on either Cheat or Back Allegheny Mountain (Alternative 1, 2, 3). This negative impact could be partially mitigated by designing the highway to follow natural land contours, thus minimizing alterations to the natural landscape. Additionally, views of the highway from sensitive areas could be partially buffered by utilizing vegetative screening adjacent to existing roads and use areas. Table 60 indicates whether the highway would be in the foreground or middleground of the landscapes viewed from existing roads and recreation areas.

Despite these negative visual impacts, the build alternatives would also provide some beneficial impacts resulting from the acquisition and rehabilitation programs and subsequent management of the selected scenic corridor. These programs could eliminate existing unacceptable modifications to landscapes and improve or strengthen other features. If a build alternative is selected and coal mining activity increases prior to the highways construction, the rehabilitation program may have to be significantly increased beyond that presented in Section IV.

The no-action alternative would not have the negative impact of introducing the strong linear element into landscapes not capable of visually absorbing this element. On the other hand, since no acquisition or scenic corridor management programs would be certain with the no-action alternative, existing unacceptable modifications to landscapes could not be corrected. Additional unacceptable modifications could result from development, timber harvesting, and mining activities.

2. <u>Historic, Cultural and Archaeological Resources</u>

In Section II, the historic, cultural, and archaeological resources were described based on research and the results of the Phase I Archaeological Reconnaissance work.[5] The Phase I work identified eleven sites (Table 23, Sites 111), probably remains of temporary Indian hunting camps, that would be directly affected, that is destroyed, by the build alternatives (Table 61).

It should be noted that the Phase I work was preliminary in nature and presents a general picture of human use and activity in the project area. Since information was not obtained for all possible sites along 100% of the length of each alternative and since detailed data was not generated on the preservation status, size, age, and function of the sites identified, it is presumptuous to use Phase I data to accurately predict impacts and to rank build alternatives according to degree of impact. However, the Phase I work established that none of the build alternatives would seriously impact large numbers of significant cultural resources.[5]

Mitigation would occur if a build alternative is selected and would involve additional Phase I work and Phase II work, culminating in a determination of where final archaeological investigations are warranted. Archaeological efforts would present complete site documentation, which constitutes an adequate level of mitigation.

TABLE 60

VIEW OF THE SCENIC HIGHWAY FROM VARIOUS LOCATIONS

	Rt. 219*	Rt. 250*	Back Mountain Road	Rt. 1/3	Rt. 9	Cass Scenic RR	Snowshoe
ALTERNATIVE 1	MG	MG	-	FG & MG	FG & MG	MG	MG
ALTERNATIVE 2	FG & MG	MG	-	MG	FG & MG	-	MG
ALTERNATIVE 3	MG	MG	MG	FG & MG	FG & MG	FG & MG	MG
ALTERNATIVE 4	MG	MG	-	FG & MG	FG & MG	FG & MG	MG
NO ACTION	-	-	-	-	-	-	-

FG = Foreground

MG = Middleground

*All Build Alternatives are in the visual foreground where they connect with existing U.S. Routes 219 and 250.

TABLE 61

HISTORIC, CULTURAL, AND ARCHEOLOGICAL RESOURCES IMPACTS

Alternative	Sites* Within Corridor
ALTERNATIVE 1	
Segment A	1, 7, 11
Segment B	2
Segment G	None
Segment C	8, and Isolated Find
ALTERNATIVE 2	
Segment A	1, 7, 11
Segment D	3, 4, 5, 6
Segment C	8, and Isolated Find
ALTERNATIVE 3	
Segment A	1, 7, 11
Segment B	2
Segment E	None
Segment H	9, 10, 13**
ALTERNATIVE 4	
Segment A	1, 7, 11
Segment B	2
Segment E	None
Segment F	12**

*Sites 1 through 10 are Prehistoric; Sites 12 and 13 are Historic; and Site 11 is Prehistoric/Historic.

**Site beyond 100 feet of centerline but within visual proximity.

The impacts of the build alternatives on Sites 12, 13, the isolated find, previously identified sites, and logging and/or mining sites would be insignificant. Because these sites are far enough from possible construction activity to avoid destruction, and will not be negatively impacted by the operation of the highway, no mitigation measures are necessary.

Similarly, the nine sites on the National Register of Historic Places would not experience any negative impacts and would, in fact, experience additional visitation because of the increase in tourism facilitated by the build alternatives. Even the Cass Scenic Railroad State Park, located in places only a few hundred feet from Segments E and H would not be negatively impacted since, except for a few glances, the view of the highway from the railroad would be obstructed by vegetation. Since the view of the park from the highway would be visually pleasing, the 1,000 foot corridor acquisition standard to be applied for construction of the highway and recreation areas can be relaxed so that none of the Cass Scenic Railroad State Park land would have to be taken. Easement acquisition, for visual quality control of the view from the highway, would also not be necessary.

In summary, existing and potential sites of historic, cultural, or archaeological significance have been and will be subject to negative impacts and destruction caused primarily by timber harvesting and mining operations. If a build alternative is pursued, identified and potential sites may be destroyed along the selected alignment, however, additional archaeological investigation and site documentation would negate this impact. In this sense, the no build alternative may have a more adverse impact on these sites than any of the build alternatives. However, given the size, type and number of sites identified during the Phase I work, negative impacts on these sites, and mitigation costs associated with the build alternatives, are neither significant nor relevant in selecting a preferred alternative.

3. Soil and Geology Related Impacts

The soils and geologic investigation which is discussed in detail in a technical report titled "Soil and Geology Assessment - Highland Scenic Highway Study"[6] has disclosed several areas where the construction of the proposed extension of the Highland Scenic Highway may impact the natural resources of the study area. The major areas of concern defined by the investigation include: landslide hazards, soil erosion, and surface and groundwater contamination. Each area of concern is discussed below.

a. Landslides

Experience of the Pocahontas and Randolph County, Soil Conservation Service and the Forest Service indicates that certain soil types and geologic formations which are found in the study area are highly susceptible to landslides due to the physical properties of the soil and the nature of the bedrock. These have been identified as:[6 7]

- colluvial, Meckesville soil derived from the Mauch Chunk Group
- colluvial, Ernest soil derived from the Pottsville Group
- residual, Teas soil derived from the Mauch Chunk Group

In many instances these soil/rock types exist in natural slopes in a state of delicate balance, and instability will occur if the balance is upset by human activities such as timber harvesting and highway construction. Failure in these materials typically occurs in the soil, colluvium, or weatered rock veneer overlying bedrock. The hazard associated with these groups of soil and bedrock is substantiated by the fact that excavation slope failures on the existing Highland Scenic Highway occurred in Meckesville and Teas soils, over the bedrock of the Mauch Chunk Group.

There are also portions of the study area where the potential exists for movement within the rock mass if excavation slopes are constructed. Identification of these areas of potential rock slope instability proved difficult during this investigation due to the scarcity of outcrops and the localized nature of folding in the study area. To properly define the areas, detailed geologic investigations, including core borings, would be required in all excavation areas; this type of investigation is typically conducted during the final design stage of a highway project.

Rock slope instability is not considered a serious hazard in the study area since stable slopes can usually be achieved through proper geologic and geotechnical design procedures and construction techniques. Expensive mitigative measures are usually not required to achieve stability.

The various alternative highway alignments are shown in plan view in Figures 24A through 24D with the locations of a potential landslide hazards indicated. The locations of the hazards are also presented in tabular form in Table 62 toprovide a method for comparing alternative alignments.

A comparison of the alternative alignments indicates that Alternative 2 has the most potential for landslide activity, with approximately 8.0 miles of the alignment being affected. The potential for slide activity on Alternatives 1, 3, and 4 is basically the same for all alignments, with approximately 4.5 miles of Alternative 1 affected, 3.9 miles of Alternative 3 affected, and 3.9 miles of Alternative 4 affected. However, it appears that Alternatives 3 and 4 are the most favorable.

It is concluded that landslides can be avoided in the study area through the employment of proper slope design and construction procedures. These procedures for stable slope design and investigation of landslides fall into three broad categories:[69] 1) avoidance or elimination of the problem; 2) reduction of forces creating the movement; 3) increase of forces resisting the movement. Several procedures which are suited to the study area are tabulated in Table 63 and are discussed in detail in the technical report[6] supporting this EIS.

b. Soil Erosion

The construction of any highway project involves the removal of existing vegetation and the introduction of embankments and excavations which change natural drainage patterns. The exposure of large areas of disturbed soils and disruption of drainage patterns often result in an increase in the amount of soil erosion and resulting sedimentation of adjacent waters.

TABLE 62

LANDSLIDE HAZARD
COMPARISON OF ALTERNATIVE ALIGNMENTS

Alternative	Segment	Location of Hazard (Station)	Length of Affected Alignment (Miles)		Soil Type	Geology	Comments
1	A	67+00 to 79+00	0.23		Meckesville	Mauch Chunk Group	
		225+00 to 374+00	2.82		Teas and Meckesville	Mauch Chunk Group	Dip Slip Potential
	B	627+00 to 689+00	1.17		Teas	Mauch Chunk Group	
	G	942+20 to 976+30	0.65		Meckesville	Mauch Chunk Group	
				4.87			
2	A	67+00 to 79+00	0.23		Meckesville	Mauch Chunk Group	
		225+00 to 374+00	2.82		Teas and Meckesville	Mauch Chunk Group	Dip Slip Potential
	D	7+50 to 14+00	0.12		Meckesville	Mauch Chunk Group	Dip Slip Potential
		74+00 to 120+00	0.87		Meckesville	Mauch Chunk Group	
		221+00 to 360+00	2.63		Teas	Mauch Chunk Group	
		390+00 to 476+00	1.63		Meckesville	Mauch Chunk and Pottsville Groups	
				8.30			
3	A	67+00 to 79+00	0.23		Meckesville	Mauch Chunk Group	
		225+00 to 374+00	2.82		Teas and Meckesville	Mauch Chunk Group	Dip Slip Potential
	B	627+00 to 689+00	1.17		Teas	Mauch Chunk Group	
				4.22			
4	A	67+00 to 79+00	0.23		Meckesville	Mauch Chunk Group	
		225+00 to 374+00	2.82		Teas and Meckesville	Mauch Chunk Group	Dip Slip Potential
	B	627+00 to 689+00	1.17		Teas	Mauch Chunk Group	
				4.22			

TABLE 63

PROCEDURES FOR STABLE SLOPE DESIGN

Category	Procedure	Best Application	Limitation	Remarks
Avoid problem	Relocate highway	As an alternative anywhere	None if studied during planning phase. Large cost if location is selected and design is complete.	Detailed studies of proposed relocation should ensure improved conditons
	Completely or partially remove unstable materials	Where small volumes of excavation are involved and where poor soils are encountered at shallow depths	May not be best alternative for large slides. May not be feasible because of right-of-way requirements.	Analytical studies must be performed; depth of excavation must be sufficient to ensure firm support.
	Bridge	At sidehill locations with shallow-depth soil movements	May be costly and not provide adequate support capacity for lateral thrust	Analysis must be performed for anticipated loadings as well as structural capability to restrain landslide mass
Reduce driving forces	Change line or grade	During preliminary design phase of project	Will affect sections of roadway adjacent to slide area	
	Drain surface	In any design scheme; must also be part of any remedial design	Will only correct surface infiltration or seepage due to surface infiltration	Slope vegetation should be considered in all cases
	Drain subsurface	On any slope where lowering of groundwater table will affect or aid slope stability	Cannot be used effectively when sliding mass is impervious	Stability analysis should include consideration of seepage forces
	Reduce weight	At any existing or potential slide	Have excavation waste that creates problems; requires consideration of availability of right-of-way	
Increase resisting forces	Drain subsurface	At any slide where water table is above shear plane	Requires experienced personnel to install and ensure effective operation	
	Use buttress and counterweight fills	At an existing slide, in combination with other methods	May not be effective on deep-seated slides; must be founded on a firm base	

Source: Schuster, R.L. and Krizek, R.J. 1978. Landslides, Analysis and Control. National Resource Council, Transportation Research Board, Report 176.

Experience of the Pocahontas and Randolph County Soil Conservation Service and the Forest Service indicates that certain soil types which are found in the study area are highly susceptible to erosion. These have been identified as:[68]

- colluvial, Meckesville soil derived from the Mauch Chunk Group
- residual, Teas soil derived from the Mauch Chunk Group
- residual, Belmont soil derived from the Greenbrier Group

The hazard associated with these groups of soil is substantiated by the sedimentation problem that occurred at the State Fish Hatchery at Edray during construction of the existing portion of the Highland Scenic Highway. Highway excavation through the highly erodible Meckesville and Teas soils caused soil erosion and resulted in high suspended sediment loads being carried to the fish hatchery by surface and ground water flows.

Other soil types found in the study area range from moderately to slightly erodible and do not present the hazard associated with the Meckesville, Teas and Belmont soils. However, minor amounts of erosion are possible from any of the soils found in the study area, and erosion control procedures must include all exposed soils.

The various alternative highway alignments are shown in plan view in Figures 24A through 24D, with the locations of soils that are highly susceptible to erosion (i.e., Meckesville, Teas, Belmont soils) indicated. The locations of the highly erodible soils are also presented in tabular form in Table 64 to provide a method for comparing alternative alignments.

A comparison of the alternatives indicates that highly erodible soils would be encountered along each alternative. Alternative 2 has the greatest potential to disturb erosive soils, with approximately 21.2 miles of the alignment located on erosive soils. Alternative 1 would present nearly as great an erosion hazard with approximately 20.3 miles of the alignment on erosive soils. Alternative 4 would disturb a smaller amount of erosive soil, with approximately 16.4 miles located on easily eroded soils. Alternative 3 presents the smallest erosion hazard, with approximately 13.7 miles of the alignment affected.

Based upon an evaluation of the erosion problems that occurred on the existing section of the Highland Scenic Highway and the techniques utilized to control erosion it is concluded that erosion could be successfully mitigated in the Edray Hatchery area and at other points along the proposed extension of the highway, if the proper procedures and techniques are followed. These are:

1. Prepare detailed erosion and sediment control plans during the design stage of the highway project. Problem areas can be identified before construction begins and mitigative techniques can be established.

This procedure was not used for the existing section of the highway; plans were prepared during the construction stage by the contractor. Because of the time constraints that usually exist during the construction stage of a project, adequate time usually cannot be devoted to erosion and sedimentation control plans and often important features are overlooked.

TABLE 64

EROSION HAZARD
COMPARISON OF ALTERNATIVE ALIGNMENTS

Alternative	Segment	Location of Hazard (Station)	Length of Affected Alternative (Miles)		Comments
1	A	0+00 to 196+00	3.71		From Station 0+00 to approximately Station 12+00 Segment A is located in the drainage area of the Eastern Hatchery Springs of the Edray Fish Hatchery
	A,B	220+00 to 440+00	4.17		
	B	496+20 to 593+30	1.84		
	B	593+80 to 614+00	0.38		
	B	624+00 to 684+00	1.14		
	B	842+00 to 878+00	0.68		
	G,C	895+00 to 1088+60	3.67		
	C	1105+90 to 1140+00	0.65		
	C	1262+00 to 1425+00	3.09		
	C	1548+00 to 1600+00	0.98		
				20.31	
2	A	0+00 to 196+00	3.71		From Station 0+00 to approximately Station 12+00 Segment A is located in the drainage area of the Eastern Hatchery Springs of the Edray Fish Hatchery
	A	220+00 to 376+00	2.95		
	D	0+00 to 147+10	2.79		
	D	159+00 to 508+00	6.61		
	C	1066+50 to 1090+00	0.45		
	C	1105+90 to 1140+00	0.65		
	C	1262+00 to 1425+00	3.09		
	C	1548+00 to 1600+00	0.98		
				21.23	
3	A	0+00 to 196+00	3.71		From Station 0+00 to approximately Station 12+00 Segment A is located in the drainage area of the Eastern Hatchery Springs of the Edray Fish Hatchery
	A,B	220+00 to 440+00	4.17		
	B	496+20 to 593+30	1.84		
	B	593+80 to 614+00	0.38		
	B	624+00 to 684+00	1.14		
	B	842+00 to 878+00	0.68		
	E	10+00 to 62+00	0.98		
	H	76+00 to 116+00	0.76		
				13.66	
4	A	0+00 to 196+00	3.71		From Station 0+00 to approximately Station 12+00 Segment A is located in the drainage area of the Eastern Hatchery Springs of the Edray Fish Hatchery
	A,B	220+00 to 440+00	4.17		
	B	496+20 to 593+30	1.84		
	B	593+80 to 614+00	0.38		
	B	624+00 to 684+00	1.14		
	B	842+00 to 878+00	0.68		
	E	10+00 to 62+00	0.98		
	F	10+00 to 93+60	1.58		
	F	98+00 to 180+00	1.55		
	F	262+00 to 283+00	0.40		
				16.43	

Erosion and sediment control should be considered during the design stage so that the necessary mitigative measures are included in the plans and specifications for the project. Also critical areas, such as the area in the vicinity of the Edray Hatchery, can be identified at this time. In developing the plan erosion control should always be a first consideration, with sediment control considered as a backup system.[70]

In the preparation of the erosion and sediment control plans, soil properties should be utilized to determine erosion potential, water infiltration capacity and other properties necessary for erosion control design. Existing and proposed drainage patterns should be evaluated, and the watershed characteristics both upstream and downstream of the project should be reviewed.[70]

When designing and constructing the erosion and sediment control features, the following basic principles should be considered:[70]

- Minimize the area and duration of construction disturbance.
- Protect bare soil from rainfall and overland flow as soon as possible.
- Reduce the velocity of construction runoff with proper control measures.
- Reduce the volume of construction runoff on bare soil by planned diversions.
- Provide temporary or permanent drainage facilities to control the runoff released from the construction area.
- Trap, or filter out, sediment before it leaves the construction area.

The erosion and sediment control plan and project specifications should include the following:[70]

- Plans with existing and proposed topographic contours. Existing topography should be defined at least 100 feet outside of the limit of work.
- Descriptions of existing vegetative cover.
- Existing drainage patterns, including streams.
- The limits of excavation and embankment.
- The location and size of each temporary or permanent drainage structure.
- Types, location, dimensions, details, and typical drawings for each erosion and sediment control measure.

- A specification that the project be constructed in small workable units so that large areas are not left exposed for long periods of time. The unit size should be specified.

- A specification that grubbing be performed in several operations on the individual work units and that only clearing be performed in one operation. This will keep the protective ground vegetation and root system in place as long as possible.

- A specification that erosion and sediment control measures be constructed and functional before ground cover is removed by the grubbing operation.

- A specification that all erosion and sediment control measures be properly maintained during the life of the project. Periodic inspection and inspection after each rainfall should be required.

An erosion control narrative should also be prepared as a part of the erosion and sediment control plan. The narrative should include:[70]

- A description of each construction activity within a drainage area.

- A description of each soil type, its susceptibility to erosion, and any treatment needed to establish vegetation.

- A description of surface water control techniques to be used during clearing and grubbing operations, construction of haul roads, construction of excavation and embankment.

- A description of off-site storm water control through the work area during construction of cross-drains.

- A description of on-site storm water control during construction.

The erosion and sediment control plan, specifications and narrative should undergo a review process by the U.S. Forest Service soil scientist, the Soil Conservation Service, and state agencies which have expertise in the field of erosion and sediment control. Pertinent comments should be included in the design.

When the project reaches the construction stage, and before construction actually begins, the contractor's personnel and design personnel should review the erosion and sediment plans to determine if any changes or adjustments are required. A site view of each control measure should be conducted at this time.

2. Schedule construction activities in especially sensitive areas during the time of the year when erosion potential is low. The construcion in the drainage area above Edray Hatchery would fall in this category.

3. Utilize erosion and sediment control methods which diffuse surface runoff in small quantities and divert the flow onto the undisturbed forest floor downslope from construction activities. The use of filter fabric, silt fences in conjunction with the filterstrip technique is especially suited to the project since silt fences can be installed by a labor force and do not require the use of heavy equipment. Access for heavy equipment may be difficult along the proposed alternatives due to terrain conditions.

It was noted that the filterstrip concept was successful where employed on the existing Highland Scenic Highway.[71]

4. Utilize sediment traps and ponds where necessary to detain construction runoff to allow suspended particles to settle out before the runoff is released to downstream areas. Filter fabric should be used at the outlet of such devices to further trap suspended particles which have not settled.

5. Utilize other erosion and sedimentation control devices such as: soil stabilization mats and netting, diversion channels, check dams, temporary slope drains, temporary diversion ditches, and temporary berms.

6. Allow not more than 750,000 square feet of surface area of erodible soil exposed at one time by excavation or embankment construction, before temporary or permanent seeding and mulching is accomplished. Further, seed and mulch embankment slopes at every 20 feet in vertical height. Require that the contractor seed and mulch any exposed area, if that area is not being actively worked.

Soil tests should be performed by the contractor to determine what soil additives and fertilization will be required for temporary seeding. The Soil Conservation Service should be contacted to aid in selection of seed species suitable to the soil type encountered.

Additionally, in areas of highly erodible soils, chemical soil binders should be used in conjunction with seeding and mulching to provide erosion protection. Soil binders penetrate into the soils and bond individual soil particles into a continuous soil mat. Since void spaces are only partially filled, water and air can continue to percolate into the soil.

If the above mentioned erosion and sediment control procedures and techniques are implemented, it is expected that erosion and sediment problems could be minimized during construction. To determine the effectiveness of the mitigative procedures, a monitoring program should be established at key points along the highway alignment and samples of stream water should be monitored before, during, and after construction. The program should provide for the monitoring of specific water quality parameters such as, turbidity, pH, total suspended solids, water temperature, dissolved oxygen, acidity, alkalinity, and conductivity.

c. Hazards Associated With Limestone Bedrock

Highway construction in or adjacent to limestone terrain can result in several types of problems due to the cavernous nature of limestone bedrock.

In other geologic units, soil and rock filter surface water before it is incorporated into the groundwater system. However, in limestone regions, sinkholes and swallow holes provide immediate access for surface water to the groundwater system and do not allow this filtration to take place. Without filtration, surface water contaminated with sediment and chemicals can enter the ground water system and alter the quality of groundwater.

Such a problem occurred north of the study area at the Bowden National Fish Hatchery in 1975 during construction of U.S. Route 33. Here excavation in limestone terrain resulted in large quantities of clay and silt being washed into caverns which are conduits to the Hatchery's springs. The sediment was then transported by conduit flow to the Hatchery's South Spring where turbidity resulted in a large fish kill.[72]

Also, as is evidenced by the problems that occured at the Edray Hatchery during construction of the existing Highland Scenic Highway, construction activities need not be located within the limestone region to result in groundwater contamination. On this project, sediment derived from erosion of soils overlying the Mauch Chunk Group was transported over two miles before reaching the limestone springs at the Edray Hatchery. Sediment was first transported by surface water in Dry Creek and Red Lick Run. Both of these streams sink in their beds and flow subsurface to the Western Hatchery Springs where they again emerge.

Other potential problems associated with highway construction in and adjacent to limestone regions are reduction of aquifer yields due to alterations of subsurface drainage patterns, and the formation of sinkholes and collapses.

Reduction in spring yield due to highway construction activities has been reported at both the Bowden Hatchery and Edray Hatchery.[71] [72]

The Greenbrier Group is the predominant limestone unit found within the study area. Some minor limestone beds are found in other geologic formations but are not considered important to this discussion. Since construction activity could potentially affect or alter existing groundwater conditions within the Greenbrier, the following were determined: (1) the locations where the alternatives are located directly over the limestone; and (2) the locations where the alternatives cross drainage areas which supply surface water to limestone terrain.

The portions of the alternative alignments which could potentially impact the limestone geology of the study area were identified and are presented in Table 65. A comparison of the alternatives indicates that all of the alternatives could potentially affect existing groundwater conditions in the Greenbrier Group limestone. Alternative 2 has the greatest potiential for impact with approximately 22.8 miles of involvement. Alternative 1 will have approximately 20.5 miles of involvement. Alternative 3 will have approximately 15.9 miles of involvement. Alternative 4 has the least potential for impact upon the limestones with approximately 11.4 miles of involvement.

TABLE 65

AREAS OF POTENTIAL IMPACT UPON LIMESTONE GEOLOGY
COMPARISON OF ALTERNATIVE ALIGNMENTS

Alternative	Segment	Location of Hazard (Station)	Length of Alternative Affecting Limestone Geology (Miles)		Comments
1	A	0+00 to 53+30	1.01		Alternative No. 1 does not cross limestone terrain
	A,B	170+00 to 717+60	10.37		
	G	1038+00 to 1060+50	0.43		
	C	1268+30 to 1320+00	0.98		
	C	1341+00 to 1434+00	1.76		
	C	1520+00 to 1719+00	3.77		
	C	1789+00 to 1850+00	1.15		
	C	1920+00 to 1940+60	0.39		
	C	1962+00 to 1982+00	0.38		
	C	2012+00 to 2026+00	0.26		
				20.50	
2	A	0+00 to 53+30	1.01		Alternative No. 2 crosses limestone terrain between Stations 138+00 and 202+50, and between Stations 234+60 and 238+00
	A	170+00 to 376+00	3.98		
	D	0+00 to 480+00	9.09		
	C	1268+30 to 1320+00	0.98		
	C	1341+00 to 1434+00	1.76		
	C	1520+00 to 1719+00	3.77		
	C	1789+00 to 1850+00	1.15		
	C	1920+00 to 1940+60	0.39		
	C	1962+00 to 1982+00	0.38		
	C	2012+00 to 2026+00	0.20		
				22.71	
3	A	0+00 to 53+30	1.01		Alternative No. 3 does not cross limestone terrain
	A,B	170+00 to 717+60	10.37		
	H	376+00 to 539+00	3.09		
	H	591+00 to 603+80	0.24		
	H	756+00 to 764+00	0.15		
	H	846+00 to 850+00	0.07		
	H	893+40 to 943+40	0.95		
				15.88	
4	A	0+00 to 53+30	1.01		Alternative No. 4 does not cross limestone terrain
	A,B	170+00 to 717+60	10.37		
				11.38	

It should also be noted that Alternative 2 is the only alternative to cross directly over limestone terrain. Approximately 1.3 miles are underlain by limestone where this alternative crosses a limestone valley near Linwood.

One of the potential impacts to be mitigated is the contamination of groundwater by sediment from soil erosion during the construction stage of the project. If sediment reaches limestone terrain it would be difficult to predict the path of sediment transport or the areas of potential damage. As was evidenced by the problem at the Edray Hatchery, sediment could be transported long distances through the subsurface by conduit flow before causing problems or damage. Because of the difficulty of predicting the path of sediment transport in limestone terrain, correction of sediment contamination would be difficult, if not impossible. Therefore, sediment problems must be corrected at their source.

It is felt that with proper erosion and sediment control techniques erosion can be minimized at the construction project thus eliminating sediment contamination in the limestone groundwater system. Erosion and sediment control procedures and techniques were discussed previously.

To determine the effectiveness of the erosion and sediment control measures, a water quality monitoring program should be established to monitor springs and water wells in the limestone terrain adjacent to the highway alignment. Samples of groundwater should be taken before, during, and after construction to assess the water quality. Specific water quality parameters such as turbidity, pH, total suspended solids, water temperature, acidity, alkalinity and conductivity should be determined from the monitoring program. Many of the major springs which will require monitoring are shown in Figure 15.

Another potential impact to be mitigated is the reduction in groundwater yield at limestone springs and water wells. Since the limestone groundwater system is largely recharged by surface water from the adjacent highlands, any reduction in the quantity of surface water in a particular stream could affect the quantity of groundwater in the limestone terrain. Reductions in surface water quantities often result where highway excavations and embankments alter natural drainage patterns and surface water is diverted from one drainage area to another. Such conditions can be avoided through proper highway drainage design.

During the final design stage of the project a thorough investigation of existing and proposed drainage patterns should be undertaken to ensure that natural drainage patterns are not altered by highway construction.

Groundwater quantities could also be affected by construction activities that occur within the limestone terrain. Blasting of limestone bedrock during excavation could cause collapses to occur in limestone caverns and channels resulting in an alteration in groundwater flow patterns; decreases in water well and spring yields are a possibility. Such problems can be avoided by minimizing the amount of blasting and excavation that is required.

Detailed studies of alternatives that cross limestone terrain would be required during the final design stage to determine the depth to bedrock and the presence of solution channels and caverns in the vicinity of the project.

Such studies should include a detailed drilling program, a refraction seismic survey and an earth resistivity survey. The results of such studies would enable the designer to determine the effect of any proposed excavations on the groundwater system of the area. As required, minor changes in vertical alignment could be made to avoid problem areas.

d. Acidity of Geologic Origin and Heavy Metal Contamination

Water quality in the study area, particularly the acidity of streams, is significantly influenced by watershed geology. It can also be affected by heavy metal contamination resulting from disturbance of certain soils and bedrock units. These potential impacts are discussed in detail in the following section on water resources.

e. Summary and Conclusions

The soils and geologic investigation has disclosed several areas where the proposed extension of the Highland Scenic Highway could impact the study area. The soils and geology related hazards which could potentially result in impacts have been identified as: landslide prone areas, highly erodible soils, limestone bedrock, and materials containing acid producing minerals or heavy metals.

Based upon a comparison of Tables 62, 64, and 65, it is apparent that all of the build alternatives could potentially impact the study area if proper mitigative measures are not employed. The tables indicate that, from a soils and geology standpoint, the greatest impact could be expected from Alternative 2.

With the use of mitigative measures, it is expected that impacts to the natural resources of the study area would be minimal. As discussed previously, successful mitigation would require careful planning and design during the final design stage of the project.

The no-build alternative would allow mining and logging operations, as well as commercial development of property, to continue in the study area. It is these activities that currently result in the most significant impact on the study area, and it is expected that the scope of these activities will not decrease in the near future, particularly with projections of increased demand for coal.

Significant erosion and sedimentation hazards are associated with both mining and logging as well as the earthwork required for commercial development (e.g. Snowshoe). While some erosion and sedimentation mitigation measures are used to minimize the effects of mining and construction, they are typically not as extensive as those proposed for the build alternatives. Additionally, the potential impacts associated with the no-build alternative would be of a longer duration than potential impacts associated with the various build alternatives.

The magnitude of the impacts of the no-build alternative is primarily dependent upon the extent, duration, and location of mining, logging and development activities. Substantial impacts could result if mining and/or logging operations expand significantly or if sensitive areas are developed commercially.

4. Water Resources

The Federal-Aid Highways Act of 1973 (Public Law 93-87) indicated that construction of the Highland Scenic Highway would not be initiated until the Forest Service had acquired sufficient lands and interests in lands (including mineral rights), within the Shavers Fork watershed, to assure an adequate scenic corridor for the highway and the control of water quality in the Shavers Fork. This would necessitate easement restrictions on road location and construction, and restrictions on development and other significant soil disturbing activities, including mining.

The following is a summary of the evaluation of potential impacts of the Highland Scenic Highway alternatives on water resources. Detailed analyses and results are contained in a technical report supporting this document.[61]

a. Surface Water

(1) No-Build Alternative

The no-build alternative would allow extensive strip mining and timber harvesting activities to continue within the Shavers Fork watershed. This constant disturbance of large areas of land, in addition to repeated erosion and sedimentation from hauling roads, has significantly impacted the water quality and fishery of the area streams. The degradation of water quality in these streams is not irreversible. However, several years could be required before the "normal" stream water quality and aquatic community are established.

No major changes are foreseen in the near future for timber harvesting operations, however, present energy needs are likely to cause significant increases in coal production in the Shavers Fork watershed. The increased mining activities could further degrade existing marginal quality streams, and severely impact additional streams not yet affected in the southern portion of the Watershed.

When economically mineable coal supplies are exhausted, the use of study area land becomes uncertain. Presently, much of the Shavers Fork watershed is owned by the Mower Lumber Company and is managed as one large unit. Should it become disadvantageous for the Mower Lumber Company to retain ownership of such a large parcel of land after mineable coal has been removed, the land could be subdivided among several owners, thereby losing its manageability as a single unit. Although acquisition of the Shavers Fork watershed headwaters is a long-term goal of the Monongahela National Forest Land Management Plan, it remains uncertain as to when funds would become available for purchase.

Another major parcel of land in the study area, at the Shavers Fork headwater, is owned by the Snowshoe Company. This land is presently being developed at a rapid pace, with construction of various housing and recreational facilities. Future plans for continued development include construction of condominiums, a golf course, tennis courts, new ski slopes, and an additional impoundment of the Shavers Fork for water supply. Although development by the Snowshoe Company has not resulted in any significant negative impacts on the waters of the Shavers Fork or to tributaries of Big Spring Fork, continued construction could degrade water quality for these local streams.

Continued harmful impacts on the study area streams, particularly within the Shavers Fork watershed, are expected with the no-build alternative. Lack of controls and insufficient enforcement protection of area streams would permit present conditions to persist and possibly worsen. The no-build alternative would not provide those deed restrictions included in the build alternative.

(2) Build Alternative/Physical Characteristics

The four proposed alternative alignments for the Highland Scenic Highway traverse four major watersheds in the project area. Stream crossings would incorporate drainage structures where necessary. The relationship of each alignment to the watersheds involved is shown in Table 66.

Additional small drainage culverts would be used at minor stream crossings and at other necessary sites along each alignment to maintain adequate drainage. Although plans for stream rechannelization have not been established at this time, it is likely that some minor channel changes would also be required to accomodate the construction of the proposed Highland Scenic Highway.

The primary impact of stream crossings and the placement of culverts would be to alter the established pool/riffle sequence of the stream to a permanent, relatively even stream flow. Stream gradient may also be slightly altered. Temporary sedimentation from erosion would occur in the area immediately downstream of the construction disturbance. However, the extent of physical changes to the stream channel would be mostly limited to the actual area required for the stream crossing. Because this length of channel would be extremely short, relative to total stream channel length, stabilization of the disturbed channel section would occur rapidly and any permanent impact is expected to be minor.

(3) Water Quality

(a) Temperature

There are relatively few stream crossings made by each of the four proposed alignments, with the exception of Segment F in Alignment 4, which parallels the Shavers Fork to U.S. Route 250. Each alignment would require a cleared and grubbed corridor, ranging up to an approximate maximum average segment width of 139 feet for Segment A; varying with slope and slope stability. This would open shaded streams to possible solar heating, but only for short lengths of the total stream. For stream crossings, placement of drainage structures approximately 50 to 140 feet in length would enclose the stream flow for much of the originally cleared area, usually leaving an insignificant amount of stream waters open to solar radiation. Shaded downstream flow would dissipate any temperature increase within stream waters, including runoff from pavement which may be considerably warmer. This is a very minor impact as compared to sections along many of the streams within the project area which already lack adequate shade due to streamside development, pasture land, timber harvesting, and mining operations. Any required stream rechannelization would necessitate the need for planting native streamside vegetative to alleviate any thermal impact, but again the impact would be very minor.

The no-build alternative would allow for existing timber harvesting and mining operations to continue, with the possibility that stream temperatures may increase, unless shade strips are properly maintained along streams.

TABLE 66

ALTERNATIVE ALIGNMENT/WATERSHED RELATIONSHIPS

	WATERSHED				
	Elk River	Greenbrier River	Tygart Valley River	Shavers Fork	Total
Alignment 1					
length (miles)	8.1	5.8	9.5	15.5	38.9
drainage structures[a]	3	0	0	3	6
Alignment 2					
length (miles)	9.9	4.3	11.5	9.5	35.2
drainage structures[a]	2	0	0	0	2
Alignment 3					
length (miles)	8.1	8.8	0.0	22.9	39.8
drainage structures[a]	3	0		2	5
Alignment 4					
length (miles)	8.1	5.8	0.0	20.9	34.8
drainage structures[a]	3	0	0	8[b]	11

[a]Major stream crossings only.

[b]A bridge crossing of the Shavers Fork not included.

(b) Erosion and Sedimentation

In any operation which involves the exposure of bare ground, the possibility of erosion with resultant siltation of streams, increases. Within the project area, the potential for erosion is high because of steep, relatively unstable slopes, and very erosive soils. Erosion and sedimentation could be expected to be high during the clearing and grubbing phase of construction, and particularly during the excavation of any new stream channels. The total acreage of disrupted land required within the construction corridor for each highway alternative, is:

Alternative 1 - 537.6 acres	Alternative 3 - 486.6 acres
Alternative 2 - 494.8 acres	Alternative 4 - 453.5 acres

The actual amount of soil loss and resultant sedimentation is difficult to quantify because of the numerous unpredictable variables involved. These variables include time of year of construction, amount of time the ground is bare, rainfall intensity during the period ground is bare, and distance of construction activities from streams.

Stream sedimentation is an impact associated with construction activities, and, as such, is a short-term impact. The amount of potential sedimentation is dependent on a wide range of unpredictable variables. It has been determined that all significant erosion, and thus, sedimentation impacts of the proposed Highland Scenic Highway could be avoided through the employment of extensive erosion control techniques. However, incorporation of these erosion control measures, including the required inspection to assure proper employment, can be extremely costly. Of course, if erosion control plans are not properly implemented, sedimentation impacts could be severe. For these reasons, the following discussion addresses sedimentation in terms of the potential for impact and the extent and costs of erosion control measures which would be required to avoid stream sedimentation.

The presence of three highly erosive soils: the Belmont, the Meckesville, and the Calvin (Teas) series, would make extensive mitigation work necessary for sections of the highway alternative routes. When these and other forest soils are compacted by machinery, or the topsoil is disrupted and removed, they become extremely vulnerable to erosion. Figures 24A through 24D show the relationship of highly erosive soils and hazardous slide prone areas to the proposed alternatives.

The amount of mileage that each highway alternative traverses erosive soils, including any portion of a study line within 200 feet thereof, is:

Alternative 1 - 20.31 miles	Alternative 3 - 13.66 miles
Alternative 2 - 21.23 miles	Alternative 4 - 16.43 miles

The potential impacts of the four build alternatives on project area streams are summarized on Table 67. Streams requiring extensive and costly erosion control measures to avoid sedimentation impacts are:

TABLE 67

SUMMARY OF EXTENT OF MITIGATION
REQUIRED TO CONTROL POTENTIAL SEDIMENTATION

Affected Streams	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Elk River Watershed				
Old Field Fork	▲	▲	▲	▲
Big Spring Fork	▲	■	▲	▲
Cup Run	-	■	-	-
Dry Fork	-	●	-	-
Greenbrier River Watershed				
Indian Draft	▲	▲	▲	▲
Cloverlick Creek	■	■	■	■
Elklick Run	■	-	■	■
Roaring Springs Run	-	-	▲	-
Allegheny Run	-	-	●	-
Tygart Valley River Watershed				
Headwaters	▲	■	-	-
Big Run	▲	▲	-	-
Logan Run	●	●	-	-
Windy Run	▲	▲	-	-
Conley Run	●	●	-	-
Stewart Run	▲	▲	-	-
Becky Creek	▲	▲	-	-
Shavers Fork Watershed				
Black Run (Upper)	●	-	-	-
Rocky Run	▲	▲	-	-
Beaver Creek	■	■	-	-
Black Run (Lower)	●	●	-	-
Lambert Run	●	●	-	●
Red Run	-	-	-	-
Oats Run	-	-	▲	▲
Second Fork	-	-	▲	●
First Fork	-	-	▲	-
Fish Hatchery Run	-	-	▲	-
Blister Run	-	-	●	-
Shavers Fork	■	●	●	■

● = Minor sedimentation potential requiring minimal control effort.
▲ = Moderate sedimentation potential requiring typical use of standard control techniques.
■ = Severe sedimentation potential requiring extensive control measures.

Cloverlick Creek - Segment A; All Alternatives
Big Spring Fork - Segment D; Alternative 2
Elklick Run - Segment B, Alternatives 1, 3 and 4
Tygart Valley River headwaters - Segment D; Alternative 2
Beaver Creek - Segment C; Alternatives 1 and 2
Shavers Fork - Segment G; Alternative 1
Segment F; Alternative 4

Because of its existing borderline quality, the Shavers Fork has been identified as more sensitive to impact than other area streams. Although Alternative 4 would disrupt the least amount of total acreage and traverse the second lowest mileage over erosive soils, it would require numerous stream crossings (Table 66) and would closely parallel the Shavers Fork for almost the entire stream length south of Cheat Bridge. Therefore, Alternative 4 would have the greatest potential impact of stream siltation for project area streams.

The no-build alternative includes the continuation of timber harvesting and mining operations within the Shavers Fork Watershed. Although present strip mining regulations have significantly reduced much of the erosion and sedimentation that could occur, not all sedimentation is prevented and roads used for hauling produce significant stream siltation. The introduction of strip mining in more southern portions of the watershed would degrade additional waters while still impacting water quality downstream. The impacts from the mining and timber harvesting activities, including the construction and maintenance of hauling roads, are relatively long-term, because of the constant disturbance and repeated stream siltation. The resultant siltation from construction of the Highland Scenic Highway would be a one time, relatively short-term, impact.

(c) Acidity

Compared to strip mining operations, construction of the Highland Scenic Highway would require less area of excavation. Mitigation measures can be used to limit any increase in acid precipitation runoff or resultant minéral acidity to a relatively short period of time. Exposure of acid forming Pottsville material can be brief. As with mine reclamation procedures, covering of the acid forming material with soil can reduce its exposure to air and moisture, thus reducing acid drainage. Liming to promote vegetative cover would add alkalinity to poorly buffered soils. If the disrupted Pottsville material does contribute some alkalinity of its own, then resultant acidity would be less severe.

Alternatives 1, 2, and 3 all have approximately 10 miles of Pottsville geology along their corridors, while Alternative 4 has approximately one mile (Figure 9). The remaining sections of each alignment traverse mostly the Mauch Chunk Group and part of the Greenbrier Group.

Alternative 4 would have the least acidic impact on study area streams, because limited Pottsville material is traversed and the potential for mineral acid input is minimal. Alternative 3 would generally have the greatest potential impact on stream acidity. This alignment crosses headwaters of several tributaries to the Shavers Fork in areas of Pottsville material, facilitating mineral acid input. However, implementation of the proper mitigation measures would effectively alleviate much of the acid impacts for all of the build alternatives.

The build alternatives would have a beneficial long-range impact because, after construction is completed, any further disturbances to the land surface within the easement areas could be controlled and better managed to avoid potential increases in stream acidity. Easement acquisitions within the Shavers Fork watershed range from almost 13,000 acres for Alternative 2 to almost 33,000 acres for Alternative 3.

With the no-build alternative, the eventual introduction of mining to more southern sections of the Shavers Fork watershed would tend to cause the streams' water quality to deteriorate, including a probable increase in acidity. Unlike the linear watershed disturbances associated with highway construction, which may or may not traverse Pottsville material, surface mining disturbance can encompass large areas and are always within the Pottsville Group in this region. Mitigation measures would have to be extensive, and even so, because of the great amount of exposed material, there can be no assurance of avoidance of additional acid loading to streams. The no-build alternative includes no control over future land use in the area. Development activities within the Shavers Fork could produce increases in stream acidity if not properly mitigated. The no-build alternative offers no means by which consideration of the delicate pollutional status of specific area streams can be assured.

(d) Heavy Metals

It has been shown that the disruption of soil and rock, with resultant siltation of surface waters, can cause substantial increases in heavy metal concentrations. Approximately 453 to 537 acres of land will be disturbed by construction activities within the project area, depending on the alternative utilized. As discussed earlier, siltation of some project area streams with potential elevated heavy metal concentrations, could result. However, it should again be emphasized that these conditions would be temporary in nature and normal condition would be restored relatively quickly.

The diverse geologies and soils within the project area vary in the type and quantity of elemental species that can be released into waters. Table 31 gave some indication of the potential for several rock and soil types from the study area to release specific heavy metals. However, such phenomena can deviate within the same geologic or soil mapping of the Pottsville, Mauch Chunk, and Greenbrier Groups could potentially lead to increases in heavy metal concentrations. Several streams affected by the construction of the adjacent section of the Highland Scenic Highway showed high suspended sediment levels in conjunction with extremely high iron and aluminum concentrations. Copper levels also exceeded instream standards. Most of this section of the highway had disrupted material of the Mauch Chunk Group.

In general, those areas of potential stream siltation from the construction of the proposed Highland Scenic Highway are also the sites of possible heavy metal loading. Alternative 4 would have the greatest overall heavy metal impact to study area streams. The specific metals and their concentration levels would be impossible to predict. However, the majority of heavy metal loading would probably consist of iron and aluminum species.

Again, the no-build alternative would offer no protection from extensive disturbances of the land surface within the Shavers Fork watershed. Continuous and increased disruption of the land surface with little control would enhance continued heavy metal loading into project area streams already affected, and to additional streams as new areas are disturbed.

Although studies indicate a potential problem exists, the introduction of heavy metals into surface waters of the project area has not, as yet, been proven to cause any detrimental impacts. However, elevated heavy metal concentrations, in conjunction with other unsuitable water quality characteristics, could be a major cause of the limited fishery within the Shavers Fork.

(4) Aquatic Community

(a) Physical Disruption

During the construction of stream crossings and new stream channels, biotic communities of the stream would be disrupted. In the case of stream crossings, the impact would be limited to the actual area of disturbance by construction equipment and installation of culverts. The diversion of stream flow through any man-made channels would destroy the aquatic habitat and organisms within the actual construction site. However, because the areas of construction are extremely minimal, relative to total stream length, there would be no overall alteration or reduction in aquatic populations. Rough stream bed surfaces within the disturbed channels would provide an abundance of habitat niches allowing drift organisms from natural sections upstream to quickly repopulate the disturbed channels. Recent studies[73] indicate that repopulation and organism diversification in new channels can occur as quickly as one year after completion of construction activities.

If the no-build alternative is selected, physical disruption of Shavers Fork waters from timber harvesting and mining related road construction and skid trail development could continue to occur. Although the impact would have minor effects on total aquatic populations, it would probably be a recurrent event, promoting significant stream sedimentation.

(b) Sedimentation

Resultant sedimentation from soil erosion can destroy stream habitat and kill aquatic organisms.[74] Soil particles in aqueous suspension block out light and inhibit the growth of aquatic plants. Silt that settles on the stream bed, covers sites for insect larvae and other bottom organisms. Thus, species characteristic of rocky stream bottoms disappear and burrowing forms appear.[74] High turbidity levels can kill fish by obstructing opercular cavities and gill rakers. It can also clog the breathing apparatus of aquatic insects. Silt settling in voids between gravel reduces available feeding and spawning sites for fish, and can also suffocate fish eggs.[74]

Insufficient mitigation of erosion from the construction of the Highland Scenic Highway could result in significant impacts to existing aquatic communities. The Shavers Fork, in particular, could

suffer losses in fish and benthic populations, already under substantial stress. The build alternatives vary in the amount of potential sedimentation that could take place, and significant siltation of streams could be avoided through the use of proper erosion control measures. Alternative 4 has the greatest potential for stream siltation of the Shavers Fork, and thus could cause the most detrimental effects on aquatic organisms. Other area streams generally have more productive and diversified aquatic communities and would recover rapidly from any sedimentation impacts.

The no-build alternative offers no control of future land use within the project area and therefore offers no protection from the continuous type of sediment loading currently being experienced in area streams from improper road construction and maintenance.

(c) Increased Temperature

The most significant impact of the warming of small headwater streams is the possible degradation of stream waters as cold water fish habitat, particularly for trout. Direct fish mortality and potential stream eutrophication can result from increased stream temperature. Trout can exist temporarily in warm waters, but the physiological stress may reduce their resistance to predation and disease or inhibit their feeding and reproduction, any of which could eventually eliminate the fishery.[75]

Within the main waters of the Shavers Fork, few fish live through the summer because flows decrease and the remaining water is spread thinly over a wide flat bed with minimal shade. Low water levels and warm temperatures therefore limit over-summer survival of trout.[41 76] The lethal limit for brook trout (77.5°F) is exceeded an average of six days each summer.[24]

The build alternatives would not create any significant impacts on stream temperatures. If, however, timber harvesting strip mining, and other activities continue or increase in the future, the no-build alternative could potentially endanger the Shavers Fork fishery through indiscriminate removal of stream bank vegetation.

(d) Increased Acidity

Acid precipitation has been found to severely impact aquatic communities, particularly fish populations, in numerous areas of the United States, Canada, and Europe.[33 77 80 81] Acidity, resulting from mine drainage, has also been found to have deleterious effects on surface waters.[78 79] Studies[77 81] have shown several species of fish to fail to reproduce in waters of pH range 5 to 6. Trout are especially sensitive to low pH.[80] A summary of effects of changes in pH on various fish species can be seen on Table 68.

The major cause of the acid problem in the Shavers Fork is a combination of natural geologic characteristics of the watershed and the phenomenon of acid precipitation. Disturbance to acid-producing geology, primarily of the Pottsville Group, adds only slightly to the problem. However, because of the severity of existing water quality, even potential slight increases in stream acidity should be taken seriously and all efforts to avoid impact should be incorporated into project construction.

TABLE 68

SUMMARY OF EFFECTS OF pH CHANGES ON FISH

pH	Effects
11.5 - 11.0	Lethal to all fish.
11.5 - 10.5	Lethal to salmonids; lethal to carp, tench, goldfish, pike if prolonged.
10.5 - 10.0	Roach, salmonids survive short periods, but lethal if prolonged.
10.0 - 9.5	Slowly lethal to salmonids.
9.5 - 9.0	Harmful to salmonids, perch if persistent.
9.0 - 6.5	Harmless to most fish.
6.5 - 6.0	Not harmful unless >100 ppm CO_2.
	Significant reductions in egg hatchability and growth in brook trout under continued exposure.
6.0 - 5.0	Not harmful unless >20 ppm CO_2, or high concentrations of iron hydroxides present.
	Rainbow trout do not occur. Small populations of relatively few fish species found. Fathead minnow spawning reduced. Molluscs rare.
	Declines in a salmonid fishery can be expected.
	High aluminum concentrations may be present in certain waters causing fish toxicity.
5.0 -	Tolerable lower limit for most fish.
5.0 - 4.5	Harmful to salmonid eggs and fry; harmful to common carp; tolerable lower limit for most fish.
4.5 - 4.0	Harmful to salmonids, tench, bream, roach, goldfish, common carp; resistance increases with age. Pike can breed, but perch, bream, and roach cannot.
4.0 - 3.5	Lethal to salmonids. Roach, tench, perch; pike survive.
3.5 - 3.0	Toxic to most fish; some plants and invertebrates survive.

Modified and updated from: European Inland Fisheries Advisory Commission Working Party on Water Quality Criteria for European Freshwater. 1969. Water Quality Criteria for European Freshwater Fish - Extreme pH values and Inland Fisheries. Water Research. 3:593-611.

Build Alternatives 1, 2, and 3 would all require extensive disruption of acidic material, and without proper mitigation, could potentially lead to increased acidity of the Shavers Fork and tributaries during the construction phase of the project. Alternative 3, in particular, could deleteriously affect trout populations in streams of Back Allegheny's western slopes. Alternative 4, which crosses little Pottsville lithology would create the least input of mineral acidity. Including the use of lime during the highway's construction would neutralize resultant acid drainage and temporarily improve stream alkalinity for aquatic organisms.

After construction activities are completed, the build alternatives would beneficially impact the long-term productivity of the Shavers Fork watershed. Through the acquisition of easement control of approximately 13,000 to 33,000 acres of land surface within the watershed, the build alternatives would provide a means by which the water quality of the Shavers Fork can be given due consideration for any future development involving extensive disturbance to the land surface.

With the no-build alternative, the continuance and probable increase of strip mining and timber harvesting would likely cause some acid increases to the already acidic Shavers Fork and tributaries. This would place additional stress on fish populations, particularly trout species, causing further declines in numbers. The no-build alternative offers no means by which to assure that water quality is considered in the planning of future activities within the watershed.

(e) Heavy Metals

The presence of heavy metals such as aluminum, iron, copper and zinc, within acid waters may cause stress to aquatic organisms at slightly higher pH values than if the heavy metals were not present.[77] Results from controlled lab studies using brook trout, suggest that increased aluminum concentrations can lead to fish mortality at concentrations of approximately 0.2 mg/l or higher.[43] Other lab tests indicate that aluminum concentrations above 0.58 mg/l cause reduced hatchability and growth rates of brook trout.[82] Trout hatchery fish kills have been recorded when the waters reached iron concentrations of 1.5 to 20 mg/l at pH values of 6.2 to 7.0.[83] Lab results have shown that the hatchability, survival, and growth of brook trout was significantly reduced at iron concentrations greater than 1.37 mg/l.[82]

At Cheat Bridge the Shavers Fork's average copper, iron, and aluminum concentrations exceed the West Virginia Trout Water Quality stream limits (Table 29). Iron and aluminum concentrations of 7.4 and 5.0 mg/l, respectively, have been recorded, greatly exceeding the criteria of 0.5 and 0.56 mg/l. However, within the Shavers Fork, no fish kills have been attributed to heavy metals, although a low standing fish crop does exist.[76] It may be possible for the fish to acclimate to increasing heavy metal concentrations.[76 77]

Although heavy metals have not been shown to impact aquatic organisms within the study area, the potential exists for the fishery and possibly the benthos to be significantly affected, particularly in conjunction with increased acidity. Since the Shavers Fork is generally more acidic than other study area streams, it has the most potential to be impacted by heavy metal toxicity.

Mining and timber harvesting operations within the Shavers Fork watershed have caused excessive heavy metal loading to the stream waters. The no-build alternative would allow this impact to continue and possibly affect additional streams; resulting in additional stress to the Shavers Fork fishery.

(5) Impacts on the Cheat Minnow

The Cheat Minnow (*Rhinichthys bowersi*) has a potential of being classified as a threatened species because of its limited range within the Cheat River and Youghiogheny River systems. It should be noted that concern for the species is based on the fact that it has a limited range, not because it is rare within its range.

Possible temporary impacts to the Shavers Fork, resulting from the construction of the build alternatives include stream siltation, heavy metal loading, and increases in stream acidity. These changes in water quality, depending on the highway alternative selected, could affect the headwater populations of *R. bowersi*. Alternative 4 has the greatest potential for sediment and heavy metal loading of the Shavers Fork. Alternative 3 has the greatest potential for the addition of acid to Shavers Fork tributaries. Alternative 2 would have the least overall effect on study area streams of the Shavers Fork watershed, and therefore, would have the least impact on *R. bowersi*.

Past mining and timber harvesting operations within the Shavers Fork watershed have severely impacted the surface waters with excessive siltation, heavy metal loading, and increased acidity. The no-build alternative, with its probable increase in mining activity, permits the continued degradation of stream water quality in the Shavers Fork, which could threaten the survival of *R. bowersi* and other fish species.

(6) Long-Range Impacts

(a) Effects of Land Acquisition Program

To insure that visual quality is maintained for the proposed build alternatives, objectives have been assigned to all easement areas (see Section IV). Areas and their management objectives are delineated in Figures 20A through 20M. The quantities of land included within the scenic corridor for each alternative are:

Alternative 1 - 40,518 acres
Alternative 2 - 40,594 acres
Alternative 3 - 52,972 acres
Alternative 4 - 43,735 acres

Presently, all waters in West Virginia are protected by the State Department of Natural Resources, under Chapter 20, Article 5A, of the Code of West Virginia. However, within the study area of the proposed scenic highway, enforcement of the State Regulations, particularly on land of private ownership in the Shavers Fork watershed, has been difficult.

The incorporation of the proposed easement plan (Figures 20A to 20M) would provide certain streams in the study area added protection against future degradation. The limitations on timber harvesting, mining, and any future activities involving extensive alteration of the land surface set by the Retention and Partial Retention objectives, would reduce the potential for siltation, heavy metal contamination, and increased acidity to study area steams. Regulation of other roads within easements would also help control stream sediment from such sources.

The amount of protection and management of the Shavers Fork watershed, which includes 52,555 acres south of U.S. Route 250, varies with each alternative. Under the proposed easement plans, Alternative 3 would provide a substantial part of the Shavers Fork headwaters with added protection against potential degradation of stream water quality (Table 69). Approximate quantities of easement lands within the Shavers Fork watershed are given below.

Alternative 1 - 16,948 acres
Alternative 2 - 12,893 acres
No-Build Alternative - None
Alternative 3 - 32,948 acres
Alternative 4 - 26,020 acres

(b) Impacts of Highway Maintenance

The most significant continuing impact of the Highland Scenic Highway on the water system would be the input of surface runoff from paved surfaces. The rapid movement of water over the impervious road surface would carry quantities of grease, oil, and deicers ultimately into the surrounding streams. Although probability of this occurring is extremely high, the magnitude of the impact on the pollutional status of area streams would be relatively minor.

Any pollutant entering the streams from the completed highway surface would be immediately dispersed and diluted upon entrance into the waters. Therefore, the quantity of chemical pollutants originating from normal highway use would have a minimal impact on existing biological and chemical characteristics of area streams.

The greatest negative impact of highway use on local waters is the potential for accidental spillage of materials. The magnitude of such an impact would be critical to surrounding streams and water supplies. However, the probability of occurrence is extremely low, particularly since the Highland Scenic Highway would be designated for use by passenger cars and recreational vehicles only.

TABLE 69

WATERSHEDS INCLUDED IN EASEMENT PROGRAMS*

	Alternative			
	1	2	3	4
Cloverlick Creek	X	X	X	X
Big Spring Run	X	X	X	X
Tygart Valley River Headwaters	-	X	-	-
Windy Run	X	X	-	-
Black Run (Upper)	X	-	X	X
Rocky Run	X	X	X	X
Beaver Creek	X	X	-	X
Black Run (Lower)	X	X	X	-
Lambert Run	X	X	X	X
Second Fork	-	-	X	-
First Fork	-	-	X	-
Fish Hatchery Run	-	-	X	X
Shavers Fork (main stream, miles)	11	7	22	All

Alternative 3 not only includes all but three miles of the Shavers Fork main channel, but is the only Alternative including major holdings in the First and Second Forks headwaters, the major tributaries, in volume, to the Shavers Fork.

*Included only if easement program incorporates a major portion of the watershed in the study area.

b. Groundwater/Water Supply

The groundwater investigation of the study area has resulted in the identification of several types of impacts which could result from the proposed extension of the Highland Scenic Highway. The impacts can be categorized as those which result in a change of water quality and those which result in a change in water quantity. Contamination of limestone aquifers is perhaps the most significant potential impact but others include depression of the water table and acidification of the groundwater.

(1) Water Table Depression

Localized depression of the water could be associated with some of the larger cuts required for construction of the highway. However, water table depression is not expected to be severe or widespread, because of the location and size of the cuts.

(2) Acidification

Disturbance of the Pottsvile sandstones during the construction could result in temporary acidification of the groundwater. While the acid associated with the marcasite and pyrite in these formations is primarily a surface water problem, some acidified water would percolate down into the groundwater regime.

(3) Water Quantity

Changes in the quantities of groundwater available for use can result from highway construction. Cuts and fills, as well as surface water control devices, alter surficial drainage patterns which could result in changes of groundwater availability. Productivity of wells and springs could increase or decrease, depending on whether surface water was diverted into or out of the recharge areas. This can particularly happen in limestone terrains.

During the final design stage of the project a thorough investigation of existing and proposed drainage patterns should be undertaken to ensure that natural drainage patterns are not altered by highway construction.

(4) Contamination of Limestone Aquifers

Groundwater contamination is a possible result of highway construction, particularly in areas of cavernous limestone. The channelistic nature of the bedrock allows water to pass through it without the filtration that commonly occurs in other types of bedrock. Types of contamination associated with highway construction include sedimentation and chemical contamination.

Sedimentation of the groundwater can readily occur if adequate erosion control programs are not provided. The sediment laden surface water gains access to the groundwater regime via sinkholes and swallow holes. Sediment contamination may also be associated with blasting and equipment operation.

Although a few minor limestone beds exist within several geologic formations of the study area, the main limestone unit of concern is the Greenbrier Series. Segment D, of Build Alternative 2, crosses the Greenbrier limestone for approximately 6,500 feet in the vicinity of Linwood (Figure 9). Utilization of effective mitigation measures during its construction should prevent much of the sedimentation problem. However, it should be noted that sediment can be transported for long distances in surface waters before entering areas of limestone bedrock. Mitigation, therefore, should not be limited to limestone areas alone.

During highway operation, materials washed off the road surface may also result in some groundwater contamination. Most significant among these are sodium and calcium salts used to deice highways in winter, but other contaminants include petrochemicals (fuel, oil, grease) as well as exhaust emissions. However, dispersion and dilution of these contaminants limits the possibility for any significant groundwater pollution.

c. Edray Hatchery

Construction of the adjacent section of the Highland Scenic Highway, through particular soil types, caused flow and sedimentation problems at the Edray Fish Hatchery (see Section II. B.9.c.). The soils and geologic investigations conducted for this study[6] have disclosed several areas where the same types of erosive soils would be exposed with construction of the proposed extension of the Highland Scenic Highway, this time potentially affecting the eastern hatchery springs (Averill Spring). Approximately the first mile of the proposed highway extension is located within the recharge area of this spring. Therefore, it is important to evaluate the control procedures utilized previously and their success or failure.

The specifications for the construction of the existing Highland Scenic Highway did require that erosion and sedimentation devices be installed prior to construction. However, only log check dams, hay bales and other small scale control techniques were utilized. No sedimentation ponds were installed on the project, nor were filter strips utilized on the project until 1978, after the erosion and sedimentation problems had occurred at the Edray Hatchery.[71] When the filter strip technique of erosion and sedimentation control was used in 1978, in an attempt to correct the problems at Edray, the technique was apparently successful.[71] Small quantities of surface runoff were diverted onto the undisturbed forest floor downslope from the construction project.

Based upon an evaluation of the erosion problems that occurred on the existing section of the Highland Scenic Highway and the techniques utilized to control erosion, it is concluded that erosion could be successfully mitigated in the Edray Hatchery area and at other points along the proposed extension of the highway, if the proper procedures and techniques are followed. These procedures were summarized in Section V.E.3. of this report and are described in detail in the Soils and Geology Technical Report[6] prepared as part of the Highland Scenic Highway Study.

The Highway construction within the recharge area of Averill Spring could also potentially impact the quantity of discharge from Averill Spring, due to the diversion of surface and/or subsurface water flow. However, no significant impacts of this type would be anticipated, because this relatively short section of the proposed scenic highway doesn't traverse limestone bedrock and crosses only the very beginning of the spring recharge area.

After completion of the highway, potential impacts to the hatchery waters would mainly be from the use of deicers on the road surface during the winter season. Any salt reaching the groundwater system would be dispersed and diluted, and resultant chloride concentrations of spring waters should not reach levels harmful to trout at the hatchery.

The no-build alternative would have no impact on the Edray Hatchery.

d. Recreational Usage

(1) Aesthetics

The visual attractiveness of numerous mountain streams adds significantly to the aesthetic value of the study area. For the build alternative, the viewing of the highway in proximity to the streams would detract natural beauty. This would be particularly true for Alternative 4, which parallels the Shavers Fork and includes several stream crossings.

Whereas the aesthetic impact of the view of the highway could be considered negative, the view from the highway by the motorist would be mostly beneficial, providing pleasing views of headwater streams in open and woodland areas.

Since future development in the study area is expected to be limited, the retention of the area's visual qualities in the future can generally be expected. However, with the no-build alternative, continued increases in coal and timber removal could cause further degradation of study area streams, particularly the Shavers Fork.

(2) Fishery Related

Effects of the build alternatives on the study area fishery would vary. On a long-term basis, the acquisition program would indirectly improve fishery habitat, because of the added protection given to the watersheds. Increased accessibility to streams could lead to increased fishing use, particularly with Alternative 4, which parallels much of the Shavers Fork. Excessive fishing pressure could depress the resident fish populations. Reinstating the stocking of trout in the Shavers Fork, south of U.S. Route 250, would reduce stress on native trout and greatly enhance fishing-related recreation. If this were to be unfeasible, then catch-and-release areas could be established.

e. Mitigation of Impacts of The Highland Scenic Highway

During the construction of the existing Highland Scenic Highway, erosion of exposed soils resulted in high turbidity levels in local streams and at the nearby State Fish Hatchery at Edray. The problem was caused by a lack of timely implementation of a detailed, thorough erosion control program. When the filter strip technique of erosion and sedimentation control was used in 1978, in an attempt to correct the problems at Edray, the method was apparently successful.[71] This past event emphasizes the importance of preparing a detailed erosion and sedimentation control plan during the final design of a project to assure its incorporation in construction contracts.

The state of the art of controlling erosion and sedimentation is well advanced. A variety of techniques are available which can control even the most hazardous sedimentation potential. The implementation of these erosion control measures, however, can be extremely expensive.

Based on an evaluation of the erosion problem that occurred on the existing section of the Highland Scenic Highway and the techniques used to control erosion, it is concluded that erosion could be successfully mitigated along the proposed extension of the highway, if the proper procedures and techniques are followed. These control measures are described in detail in the Soils and Geology Technical Report prepared for this study,[6] and are summarized in Section V.E.3. of this report.

In addition to the procedures and techniques for the control of soil erosion and sedimentation from the highway construction, other methods of mitigation should be utilized in the project plans to protect streams from other types of potential impacts.

To minimize impacts of acidity, resulting from construction of the highway through areas of the Pottsville Group and from increases of unaltered acid precipitation runoff, control measures should include:

- Cover acidic materials with topsoil to limit exposure to air and water.
- Use shale or limestone as road fill near or at stream crossings rather than the acidic Pottsville sandstone.
- Periodically lime the construction area to effectively neutralize runoff until vegetation is established.
- Promptly revegetate exposed areas, particularly those composed of acid materials.

Although the build alternatives would not significantly increase stream temperatures, the following should be considered:

- Avoid removal of shade-producing vegetation near steams.
- Plant native shade-producing vegetation on stream banks where vegetation has been removed as a result of the highway construction.

Heavy metal loading to streams is generally mitigated with the control of erosion and sedimentation.

Since fuel spills are the greatest potential source of chemical contamination of groundwater, preventive measures during construction of the highway should include:

- Locate fueling facilities outside the karst regions and away from streams.

- Use dikes and impervious liners with all fueling facilities and deicer storage areas to contain any spills or runoff.

To determine the effectiveness of the mitigative procedures, a monitoring program should be established at key points along the highway alignment and samples of stream water should be tested before, during, and after construction. The program should provide for the monitoring of specific water quality parameters such as turbidity, pH, total suspended solids, water temperature, dissolved oxygen, acidity, alkalinity, conductivity, and heavy metals.

f. Summary Discussion and Conclusions

The major threat to the streams of the Shavers Fork watershed is acidity. The stream waters are naturally slightly acidic due to watershed geology. Constant disturbance of the land surface and exposure of acid material by timber harvesting and strip mining activities for the past century have continually added acidity to the streams. Within the past decade, acid precipitation from a polluted atmosphere has caused even more acid loading of stream waters. At present, there is no evidence to suggest that this trend of increasing acidity of the Shavers Fork will change. In time, stream water acidity can be expected to reach levels in which few, if any, aquatic organisms can survive; the streams will then become sterile.

Whether or not the proposed extension of the Highland Scenic Highway is built will have little effect on this eventual fate of the Shavers Fork watershed. Because the future of the Shavers Fork streams is uncertain, the evaluation presented in this report is necessarily based on existing stream characteristics and resident aquatic communities. It is important to realize, however, that if the proposed highway is constructed, the status of the streams by the time construction would begin may be quite different than that of today. All impacts discussed in this evaluation for both the build and no-build alternatives should therefore be considered in proper perspective to the overall current and projected future dynamics of the Shavers Fork aquatic ecosystem.

Another issue which must be discussed here is strip mining activities in the Shavers Fork watershed. This evalvation of water resources impacts is based, again due to the uncertainty of the future, mostly on existing conditions in the watershed. A difference

between the build and no-build alternatives has been identified; i.e., increased mining activity is assumed with the no-build alternative. However, the specific timing of events in the near future could reduce this difference in impact between the no-build and build alternatives as related to projected mining activity. The possibility exists that, if a build alternative is selected, an accelerated mining program could be initiated within the selected corridor, with the purpose of removing the economically mineable coal reserves prior to highway construction.

Should this occur, the major difference in mining activity associated with the build and no-build alternatives would be one of the time period within which coal reserves are removed, rather than the quantity of coal removed or amount of land surface disturbed. The build alternatives would induce a secondary impact of accelerated coal mining activity. This would be a relatively short-term, but concentrated effect. The build alternative, once constructed, would then have the long-range impact of protection of lands within easements from future significant surface disturbances. The no-build alternative would have a similar impact of removal of economically mineable coal, but most likely, extended over a longer period of time. The no-build alternative would provide no means to limit the continual disturbance of new areas, or the remining of previously mined areas as advanced technology makes it economical to mine additional seams.

With the exception of parts of the Shavers Fork, water resources in the study area are generally rated high quality and have not been adversely impacted in recent times. Though development in this area has been sparse, it is uncertain whether streams and groundwater supplies would be protected against possible degradation from future development.

In the evaluation of potential impacts on water resources, emphasis has been placed on the Shavers Fork because of:

1. Public Law 93-87 indicated that construction of the Highland Scenic Highway would not be initiated until the Forest Service had acquired sufficient lands and interest in lands (including mineral rights), within the Shavers Fork watershed, to assure and adequate scenic corridor for the highway and the control of water quality in the Shavers Fork.

2. Water quality and aquatic biota of the Shavers Fork have already been significantly impacted by mining and timber harvesting operations withing the watershed.

3. The Cheat minnow, which has been indicated as a threatened species, could be adversely affected by the highway construction.

4. Public concern.

The deterioration of stream water quality in the Shavers Fork and tributaries has been a result of extensive coal mining and timber harvesting operations, and the occurrence of acid precipitation. Widespread removal of vegetation and disturbance to the land surface, in addition to problems with hauling roads, has caused severe erosion and siltation, and some degree of heavy metal contamination, in these waters. Increased acidity in stream waters has been caused by meteoric acid input and by mineral acidity. Years of adverse land use management in the Shavers Fork watershed has also led to higher stream water temperatures in the river. Such degradation of surface waters has resulted in severe stress to the fishery and benthos, enough to limit habitat and cause declines in populations.

Potential significant impacts of the no-build alternative on water resources are:

- Degradation of waters in the Shavers Fork watershed would continue from the expansion of timber harvesting, strip mining, and road construction activities. Other future development activities could adversely affect the Shavers Fork, and other area streams.

- The deterioration of water quality in the Shavers Fork and tributaries would deleteriously affect fish and benthic populations, particularly native trout. The Cheat minnow, with its limited range, could also be impacted.

- Access to surface waters for recreational usage would remain limited mainly to hauling roads and jeep trails. The absence of trout stocking in the Shavers Fork, south U.S. Route 250, would probably continue.

Although construction of the adjacent section of the Highland Scenic Highway had caused serious siltation of local streams and spring waters at the Edray Fish Hatchery, temporary construction-related impacts of its extension would generally be minimal if properly controlled. Long-range impacts of the proposed project on water resources of the study area would be beneficial. Potential significant impacts of the build alternatives are:

<u>Short-term, construction-related impacts</u>

- Sedimentation would be extremely costly to control and, if not controlled, would cause significant impacts in the following streams:

  Alternative 1: Cloverlick Creek
Elklick Run
Beaver Creek
Shavers Fork

  Alternative 2: Cloverlick Creek
Big Spring Fork
Tygart Valley River headwaters
Beaver Creek

Alternative 3: Cloverlick Creek
Elklick Run

Alternative 4: Cloverlick Creek
Elklick Run
Shavers Fork

Long-range impacts

- Sedimentation of area streams, particularly the Shavers Fork, will decrease as a result of control offered through easement acquisition of 40-53 thousand acres of land.
- The potential for heavy metal contamination and acid pollution will decrease as land surface disturbance in the Shavers Fork is controlled.
- Including land easements would provide opportunities for long-range protection and management of 40,518-52,972 acres within the study area. Water quality could improve and be maintained for those streams within easement areas. This, in affect, would improve fishery habitat.
- Access to streams for recreational purposes particularly fishing, would be enhanced. Although excessive fishing could stress native populations in certain waters, stocking of trout or establishing catch-and-release areas would alleviate such problems.

Based on the comparative analysis of potential effects on water resources of the build alternatives, it has been concluded that Alternative 3 would have the least adverse impact on area streams and provide the best opportunities for long-range improvements. This conclusion was reached by ranking the alternatives within each potential impact category and then weighing each potential impact as to significance. Criteria used to consider significance of impact included:

- probability of occurring
- duration
- irreversibility
- controllability
- geographic scope
- magnitude
- policy conflicts

Regulations on the National Environmental Policy Act require that the environmental impact statement's analysis of impact specifically include consideration of irreversible and irretrievable commitments of resources, probable adverse environmental effects which cannot be successfully mitigated, and the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity.

- There would be no irreversible or irretrievable commitments of existing water resources for highway use.

- The proposed extension of the highway would produce no significant adverse impacts on water resources which could not be successfully mitigated.

- The short-term use of the environment for construction of the extension of the Highland Scenic Highway would have a beneficial effect on the maintenance and enhancement of long-term productivity of the water resources. The project would provide for the acquisition of a large tract of relatively remote headwater stream lands to be maintained in that condition, to be protected from future human development, and to be managed for scenic and recreational qualities belonging to the natural environment.

5. Wildlife

The following is a summary of the evaluation of potential impacts of the extension of the Highland Scenic Highway on wildlife. Detailed analysis and results are contained in a technical report supporting this document.[10]

a. Habitat Removal and Alteration

Under the no-build alternative, changes in wildlife habitat for the next 10-20 years would probably result mostly from: continued surface mining and timber harvest in the northern part of the study area; residential and recreational development at and near Snowshoe Resort; and periodic timber harvest in the southern part of the area. It is unlikely that habitat improvement would be a major objective on the large proportion of private lands which are being managed principally for other uses. Normally practiced timber harvest and surface mining, with current reclamation practices, can benefit those wildlife species preferring herbaceous, brushy, or mixed vegetation types, but may be detrimental to those species preferring extensive old growth forests. Residential and recreational development is generally detrimental to most species of wildlife, especially those requiring a high degree of remoteness such as black bear and turkey.

When economically mineable coal supplies are exhausted, the use of study area land becomes uncertain. Contributing to the remoteness of the Shavers Fork watershed is the current ownership of land in extremely large contiguous parcels. Much of the Shavers Fork watershed is owned by Mower Lumber Company and the land is managed as one large unit. Should it become disadvantageous for Mower Lumber Company to retain ownership of such a large parcel of land after mineable coal has been removed, the land could be subdivided into smaller parcels with several owners. Accordingly, control of the land as a unit would be lost and control of land use and development would have to be exercised through any future local zoning ordinance which may be enacted. Although acquisition of the Shavers Fork headwaters watershed is a long-term goal of the Monongahela National Forest Land Management Plan, it remains uncertain as to when funds would become available for purchase.

Another large parcel of land in the study area at the Shavers Fork headwaters is owned by the Snowshoe Company. This land is presently being developed at a rapid pace, including construction of condominiums, lodges, restaurants and ski slopes. Future plans include continued construction of condominiums, a golf course, tennis courts, new ski slopes, and an additional impoundment of the Shavers Fork for water supply. This type of development activity can be extremely detrimental to wildlife habitat. Secondary impacts include associated commercial development of adjacent areas by others.

Although the existing use of the land of the study area does not severely affect wildlife habitat due to current ownership patterns, the length of time this condition would continue is questionable. Many letters have been received during this study from citizens and organizations concerned about the loss of wild remote areas in West Virginia through residential and commercial development. There is no reason to expect the study area would be an exception to this development trend, and long-range impacts of the no-build alternative can be expected to be a gradual degradation of wildlife habitat. The no-build alternative offers no future protection to, or controls of, wildlife habitat in the area.

The four build alternatives, and their associated recreational development and acquisition programs, are shown on Figures 20A through 20M. The most immediate impact on wildlife of the build alternatives to extend the Highland Scenic Highway would be the destruction of existing natural vegetative communities during the clearing and grubbing, and construction phases of the project. Some of this area would be paved and permanently lost as wildlife habitat. The remainder of the area would be revegetated and eventually provide habitat, although probably of a different type from that which originally existed.

Permanent habitat loss to paved roadway surface for the four build alternatives would be:

Alternative 1 - 187 acres	Alternative 3 - 193 acres
Alternative 2 - 171 acres	Alternative 4 - 169 acres

Actual paved area would be slightly higher than these estimates due to parking areas or short access roads at scenic overlooks and picnic areas. Considering the thousands of acres of remaining habitat in the study area, the physical loss of this habitat would not constitute a significant impact on wildlife.

Clearing and grubbing quantities have been estimated for each alternative alignment.

Alternative 1 - 538 acres	Alternative 3 - 487 acres
Alternative 2 - 495 acres	Alternative 4 - 453 acres

These quantities include all habitat to be disturbed and therefore include the previously given areas to be paved. The amount of each habitat type affected by each alternative is given in Table 70. The quantities given are the

TABLE 70

CLEARING AND GRUBBING QUANTITIES
BY VEGETATION TYPE PER ALTERNATIVE

Vegetation Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4
MH	61.39	51.7	57.15	57.15
MH (OC)	11.1	13.39	11.1	11.1
MH (RC)	11.32	16.43	11.32	11.32
MH (P)	1.62	2.8	1.62	1.62
MH (S)	6.92	6.92	6.92	6.92
OF	23.34	52.56	23.34	23.34
OF (F)	9.36	22.53	9.36	9.36
NH	148.53	150.14	84.22	138.95
NH (OC)	21.32	17.38	23.17	21.32
NH (RC)	9.26	9.38	9.26	9.26
NH (C)	7.08	3.59	12.19	-
NH (P)	62.73	44.01	50.72	36.3
NH (S)	15.51	11.81	45.28	4.14
SCRUB HARDWOOD	12.33	-	12.33	12.33
BBM	22.85	7.46	22.85	22.85
NH-SP	26.36	19.09	9.16	26.0
NH-SP (C)	5.53	0.92	-	-
NH-SP (P)	23.47	21.87	1.6	1.6
NH-SP (S)	17.50	17.50	-	-
NH-SP (CC)	-	-	1.35	-
SP-NH	20.41	6.28	24.43	46.7
SP-NH (C)	-	-	22.20	-
SP-NH (P)	4.2	4.2	1.37	-
SP-NH (S)	-	-	0.62	-
SP	9.57	8.86	37.23	12.78
SP (C)	5.43	5.43	1.21	-
SP (P)	-	-	0.84	-
SP (S)	-	-	4.79	-
SP (CC)	-	-	0.96	-
WET	-	-	-	0.41
STRIP MINE	0.5	0.5	-	-
TOTAL	537.63	494.75	486.59	453.45

best estimates that can be made at the current level of engineering design and would be subject to vary with subsequent phases of highway design. For some wildlife species, such as the wild turkey, and black bear, the area cleared would most likely remain lost as habitat, even though revegetated after highway completion. Other species of wildlife, such as deer, snowshoe hare, grouse and squirrels would be less affected, and some species, such as songbirds and small rodents may actually benefit from the creation of herbaceous and edge habitats.

In addition to the area of actual paving and the area of clearing and grubbing, the build alternatives include acquisition, and/or control through easement, of a scenic corridor along the proposed extension of the Highland Scenic Highway. These corridors are delineated for each alternative on Figures 20A through 20M. Amounts of land included within the scenic corridor for each alternative are:

Alternative 1 - 40,518 acres	Alternative 3 - 52,972 acres
Alternative 2 - 40,594 acres	Alternative 4 - 43,735 acres

Land within the scenic corridor would be managed for visual quality and changes to the land surface would be limited to those compatible with the visual character of the area.

The build alternative thus would offer a degree of long-term control over and protection to wildlife habitat due to easement restrictions within the scenic corridor for maintenance and achievement of visual quality objectives. The degree of protection would depend on the specific terms of the easement. Where lands were acquired in fee, the Forest Service would have the opportunity to manage and improve habitat where desirable to meet wildlife objectives. Where easements were acquired for protection of visual resource and (in the Shavers Fork watershed) for control of water quality, the degree of protection would be limited to the easement restrictions.

The actual physical loss of habitat can be a significant impact in areas where a project crosses a unique or scarce habitat, or where little undeveloped land remains. In the case of this project, the loss of 169-193 acres and alteration of an additional 284-351 acres would, in itself, have little impact on most of the area wildlife due to the vast quanitity of relatively undeveloped land in the study area. Rather, the significant impacts of the Highland Scenic Highway extension would be mostly associated with subsequent usage. Species warranting more detailed analysis are discussed below.

All of the build alternatives pass near at least one known population of the Cheat Mountain salamander either at Barton Knob, Thorny Flat or Back Allegheny Mountain. The quantity of land surface disturbed with construction of the highway, however, would be minimal compared to the amount of land disturbed in some of these areas by past and present mining and timber harvesting activities. If the proposed highway is built, the

area included in the scenic easement would be protected from any activity causing extensive alteration of the land surface. So, even though the highway would disturb habitat, the overall net effect would be a substantial increase in undisturbed, or controlled, habitat. The build alternatives would also offer protection on easement land for the entire length of the route and, therefore, perhaps to other unkown populations of the salamander. Whereas little control can, at present, be exercised over activities occurring on privately owned lands, federal ownership or easement control can facilitate management techniques and habitat protection to benefit the species. Acquisition of private lands on which the salamander occurs is a recommended management guideline for maintaining the known populations of the Cheat Mountain salamander.[19]

The physical loss of habitat, although small when compared with the total available remote land in the area, may constitute a significant impact if the affected habitat is rare or critical to survival of a species. Portions of the study area south of Shavers Fork support relatively high turkey populations and lack remote open field cover. The highway alignment of all four alternatives crosses two large field areas at the tops of Elk Mountain and Moffett Knob and several smaller open areas. Other field areas would remain undisturbed by the proposed highway extension. Although open areas are not an essential habitat requirement of wild turkeys, the presence of this type of vegetation within the range has been shown in some areas to improve habitat to support greater densities and to aid in winter survival.[86] The degree of the effect of removing a portion of the old field type of cover would depend on whether the lack of this type of habitat is now a limiting factor on the wild turkey population in this part of the study area. Although detailed information is not available, many other environmental variables most likely have a greater influence on the wild turkey density than the presence of old field type cover, and the removal of this habitat would not, in itself, be expected to cause a significant reduction of the wild turkey population of the area. The primary impact on habitat quality for wild turkey would be the loss of remoteness within a zone of influence extending at least 1/4 mile from the Highway. Some loss of habitat would be expected up to 1/2 to 3/4 mile from the road.

The snowshoe hare population in West Virginia and Virginia represents the southernmost limit of the species and is isolated from more northern pouplations by approximately one hundred miles. This fact warrants concern about any project having a potential effect on the hare's habitat. A critical component of the snowshoe's habitat requirements in West Virginia has been identified as young, low, evergreen vegetation at high mountainous elevations. Habitat interspersion is extremely important and hare activity has been shown to be highest in coniferous forest edge habitats near clear-cuts.[86, 88] Spruce and other conifers provide necessary winter foods, but the hare will feed on deciduous leaves and shrubs during the summer. The Shavers Fork watershed supports a high density snowshoe population due to the presence of young spruce forests, thick rhododendron patches, and the relative inaccessibility of the area caused by severe topography and lack of a sophisticated roadway network.

Probably the greatest potential impact of the build alternatives on the snowshoe hare habitat would be a result of future management of easement lands rather than actual disturbance associated with construction

of the facility. A juxtaposition of various age classes of vegetation is necessary to the maintenance of good snowshoe hare habitat. Therefore, any management policy not permitting the periodic cutting of vegetation would be disadvantageous to the hare through a gradual reduction of low evergreen cover. Since the clearcutting method of timber removal encourages regeneration of red spurce, its usage should be retained in the project area if an adverse impact on the snowshoe hare is to be avoided.

In summary, the short-term impacts on wildlife habitat of the build alternatives would be a disturbance to 453-538 acres of land. This disturbance is not expected to cause significant reductions to wildlife populations. The overall long-range impact would be the permanent removal of 169-193 acres of wildlife habitat and significant reduction in turkey and bear habitat quality within 1/4 to 1/2 mile of the road or about 11,000 to 22,000 acres. At the same time some degree of habitat control and protection for a variety of wildlife species would be afforded by acquisition of lands in fee and scenic elements on 40,518 to 52,972 acres. Varying levels of resource management activities within these acquisition areas consistent with protection of scenic values would retain a diversity of habitat conditions. The short range impacts of the no-build alternative would involve disturbance of greater quantities of land than associated with the build alternatives. These disturbances however do not usually constitute irreversible losses of habitat and could retain a general diversity of habitat in the long run where activities were intermittent. The principal long-range adverse impacts of the no-build alternative would result from possible human development through subdivision and construction of homes, recreational facilities and other commerical enterprises. Such development is probable within the Snowshoe Resort area and on many of the private tracts to the south.

b. Restriction of Mobility Patterns

Construction of a highway through a relatively undeveloped area can often affect daily and seasonal movement patterns of wildlife, by presenting a barrier to movement and/or by preventing usage of adjacent land. The degree of impact varies with highway width, traffic volume, and associated level of adjacent development. Traffic projections for the Highland Scenic Highway are higher than those of most other roads in the study area (Section V.A.4.). However, a danger in comparing traffic volume data is that one may incorrectly assume that the barrier or avoidance effect of a similarly travelled section of U.S. Rt. 219 or U.S. Rt. 250 would be an indication of that to be associated with the Highland Scenic Highway. There are several factors which render this assumption invalid. The proposed extension is designed to follow topographical contours and has a design speed of only 30 mph. Other design standards, such as maximum grade and horizontal curvature, are also very different from those of a highway such as U.S. 219 or 250. Perhaps the most important difference is the purpose of the facility. Whereas highways are usually designed with the purpose of providing the safest and fastest route between two points, the Scenic Highway has the very different purpose of providing the leisurely recreational experience of viewing and enjoying natural scenery. These basic differences preclude direct comparison of the two types of roadways as barriers to wildlife movement.

The results of our evaluation indicate the proposed extension of the highway would have minimal impact on the movement and activities of most wildlife species in the project area, such as deer, grouse, squirrel, bobcat, beaver, songbirds, and many other resident animals. Loss of habitat and some avoidance of the highway would cause an emigration of some individuals to adjoining areas. Depending on the dynamics and balance of the adjoining area this wildlife movement could increase population levels above normal carrying capacity. Because of the large expanses of similar habitat in the project area, it is doubtful that carrying capacity is at its maximum, and any permanent reduction or effect on these wildlife populations would not be substantial.

Because of concern for the species, and reported intolerance to human activity, the black bear, wild turkey and snowshoe hare warrant more detailed analyses.

Whether or not the black bears of the study area would cross the proposed highway is particularly important if the highway divides important seasonal habitats. Alternatives 1, 2 and 4 (Segments C and H) would generally separate two differing vegetative types: The beech-birch-black cherry-red spruce vegetation of the Shavers Fork, and the oak-hickory vegetation of the eastern slopes of Back Allegheny Mountain and western slopes of Cheat Mountain. As described previously, the red spruce forest, although offering excellent cover and denning sites, lacks good mast-production. In the Shavers Fork watershed, however, much of the original spruce forest is being replaced with northern hardwoods and with shrub or sapling cover as a result of continuing mining and timbering activities, resulting in greater mast-production.

Radio-telemetry studies of black bear by the West Virginia Department of Natural Resources indicate that bear in the Shavers Fork area depend on the food supply provided by the oak hickory forests outside the watershed.

The degree to which the Highland Scenic Highway would act as a barrier to movements of bears would depend in part on the volume of traffic and type of human activity. The presence of the Skyline Drive in Western Virginia has apparently not reduced or affected black bear populations in Shenandoah National Park where bears freely cross the parkway.[90] However, hunting is prohibited in the National Park and the bears have become acclimated to man. Bear hunting would be permitted along the Scenic Highway, as it is in most areas in and near the Monongahela National Forest. Available studies indicate that open public roads in West Virginia will act as barriers to the movement of bears, and it is assumed that this would be true of the Scenic Highway.

As briefly mentioned in the discussion of habitat alteration, the proposed extension of the scenic highway would have an impact on the mobility patterns of the wild turkey population. Except during periods of little or no usage of the roadway, wild turkeys in the area would be expected to avoid crossing the road and avoid usage of land near the road, picnic area, and scenic overlooks. The proposed project would not only remove this area from useable habitat but may cause additional stress by preventing access to required seasonal habitats. The overall effect would be a dispersal of wild turkeys out of the area. This impact would be mostly limited to the southernmost seven miles of the proposed facility. The remainder of the routes would cause little impact because of locations in generally poor wild turkey habitat and low density populations.

Assuming a major loss of turkey habitat within 1/2 mile of the road, about 4,500 acres of habitat which could support about 50-60 turkeys would be lost. This represents about 15% of the present relatively remote habitat in the study area bounded approximately by U.S. 129, Secondary Route 9 and Secondary Route 1. This loss could be partially mitigated only by intensive habitat improvements in adjacent areas.

The proposed extension of the highway would most likely produce only minor impacts on the snowshoe hare movements in the study area. The paved area would be approximately 44 feet wide. Cleared areas adjacent to the highway would regenerate with low shrub vegetation offering good cover for the hare. As with all discussions of impacts thus far, this conclusion is based on usage of the facility for scenic driving and picnicking only.

In summary, the proposed extension of the Highland Scenic Highway would cause only minor impacts on most wildlife movements in the study area. These impacts would not be of a degree to cause substantial impacts on wildlife population levels. Exceptions to this are the black bear and wild turkey. The Highway, particularly Alternatives 1, 2, and 3, would severely restrict movements of black bear to critical feeding areas. This impact could not be feasibly avoided except by prohibiting hunting, particularly in areas of soft mast and beech, which is not desirable since it would represent a loss of existing recreation opportunity. The project would also remove about 15% of the available wild turkey habitat in the southern project area, and perhaps more through isolation of necessary seasonal habitats. This impact could be mitigated through habitat improvements in public lands east and west of the highway.

c. Increased Hunter Access

The impact evaluation thus far has considered the construction and use of the proposed facility for scenic driving and picnicking only, without consideration of increased hunter access. This approach is appropriate for two reasons: 1) hunting is a controllable activity not necessary for use and enjoyment of the facility for its intended purpose; and 2) there is a significant difference in impact of the facility based on whether hunting is considered.

The extension of the Highland Scenic Highway would provide hunter access to areas which, at present, are relatively inaccessible, and a corresponding increase in hunting pressure can be expected. This impact would be greatest with Alternative 3, due to the location of Segment H through a rather large relatively inaccessible area along the top of Back Allegheny Mountain from Second Fork headwaters north to U.S. Route 250. Alternatives 1 and 2, which both contain Segment C following the ridge tops of Cheat Mountain, would have a similar impact but slightly less severe. This mountainous area presently has jeep trails and logging raods providing limited access, but more than exists on Back Allegheny Mountain. Alternative 4, along the Shavers Fork would have the least impact because of existing access at least for some distance along both sides of the stream. Although these are private roads and somewhat controlled via a permit system for hunters, illegal access is often gained quite easily due to lack of enforcement. All build alternatives would produce an impact of increased hunter density in the southern project area along Segment A.

That the proposed facility would be used by hunters is supported by traffic data for the adjacent section of the Highland Scenic Highway from U.S. Route 219 southwest to Route 39. Increases in traffic volumes correspond positively to the occurrence of hunting seasons.

The primary recreation emphases identified in the Monongahela National Forest Land Management Plan is to enhance the primitive forms of recreation including hunting and fishing. National Forest land within the study area, including any land acquired in fee for this project, would be open to public hunting. Policies of private landowners vary from tract to tract. Mower Lumber Company property in Shavers Fork is open to hunting under a fee permit, but nearly 6,000 acres of Snowshoe corporation property is closed to public hunting. Hunting on other properties may be prohibited, allowed by permission only, or be unrestricted. Improved access and increased hunting pressure would probably lead to increasingly restrictive posting of private lands within the study area.

The assumptions are made in this study that private landowners' policies in the vicinity of the Shavers Fork watershed would continue as at present (permitted on practically all lands except Snowshoe) and that hunting would be restricted on most private lands in the southern portion of the study area. However, the effectiveness of such restrictions is highly variable depending on the degree of voluntary compliance and of landowner enforcement. It is reasonable to assume that there would be a significant increase in hunting pressure near the Highway throughout most of the study area regardless of ownership or landowners' policies.

Increased accessibility would affect all game species of the area. For most species, this impact would not cause substantial long-term reductions in population levels, although an initial depression may be noticed. Due to the rugged terrain of the area, increases in hunter density would be mostly concentrated around parking areas of the proposed facility. The populations of grouse, deer, squirrel, and other game animals hunted or trapped, would be reduced in these areas during hunting and trapping seasons. The populations would recover somewhat by the next year's season, but most likely would remain lower than population levels farther from the highway. Non-game animals can also be affected by illegal kills or by disturbance by hunters.

Increased hunter access provided by the extension of the Highland Scenic Highway would have a significant impact on the black bear population of the study area. Since the study area has state-wide importance in that it is one of the few remaining prime black bear breeding habitats in the state, this impact would extend beyond local or regional significance. Increased access would result in more stable populations of bears with a large number of older animals being exposed to hunting pressure. The result can be an overharvest of female bears which can cause significant reductions in the bear population. Local areas of public property that are intensively hunted annually would be the most likely to suffer from such overharvests of female bears.[94]

The overharvest of female bears has been recognized as a problem in West Virginia. The bear season has been shifted to later in the year when most females have already entered dens, with the goal of reducing the percentage of females in the harvest. This technique was very successful the first year (1979), reducing the female harvest by more than 30 percent.[15] This successful management measure would lessen the severity of impact of the proposed highway project. An increase in harvest would be expected, but a permanently damaging effect through overharvest of females would most likely be avoided. However, there is little doubt that the proposed project, particularly Alternative 3, would place the resident black bear population in jeopardy and a substantial reduction in population levels could be expected. As bear densities drop, hunter success would also decrease, most likely leading to a reduction in hunting pressure and in the wildlife-related recreational benefits offered by the project.

The adverse impacts of increased hunting pressure on black bear populations could theoretically be minimized by prohibiting hunting, changing of hunting regulations, or restricting parking. Prohibiting hunting or establishing special regulations are undesirable and generally contrary to Forest Service and Department of Natural Resources policies. They would result in the loss of an existing recreation opportunity and would be adopted only as a last resort.

Whereas impacts to bears would be concentrated in the Shavers Fork watershed and thus differ with the various build alternatives, the impact to the wild turkey population would be most significant in the southern project area where all alternatives have a common alignment and would thus be relatively the same for all of the build alternatives. The impact on wild turkeys of increased hunter access provided by the proposed highway would generally be of two types: increased harvest and increased disturbance by deer hunters. It should be noted, however, that the overall impact of improved accessibility would be much less in this portion of the study area than in the more remote Shavers Fork watershed. This area, between Secondary Route 9 and U.S. Route 219, although containing relatively small remote pockets, is generally more developed, with a rather extensive network of gravel roads and trails, when compared with the Shavers Fork area.

As with other game species, land immediately adjacent to parking areas would be most susceptible to increased hunting pressure. Just the presence of the Scenic Highway and its usage for scenic driving would be expected to cause a depression in wild turkey density in areas adjacent to the facility

(see discussion on mobility patterns). Thus harvests in this immediate area would not be particularly high. However, increased harvests could be expected in lands farther from the highway. It is uncertain whether harvests would increase to a degree to permanently reduce turkey density in these areas. As with bear hunting, turkey hunting activities associated with the highway should be closely monitored during the first few seasons after completion of the highway to determine what, if any, management response would be necessary.

The portion of the project area supporting a high density turkey population also supports a high density resident deer population. Although increased deer hunting pressure would not be expected to significantly affect the deer population, it could aggravate the impact on the wild turkey population. Although detailed studies of the project area's turkey populations are not available, existing information indicates that turkey populations in West Virginia are relatively sensitive to human disturbance (see Section I.B.2.). Based on this assumption, a reduction in turkey densities in the project area would be associated with both turkey and deer hunting seasons. The severity of this impact would inversely correlate with distance from the highway. The duration or permanency of the population reduction would depend on many contributary factors which fluctuate annually.

Because snowshoe hares are often hunted with dogs and do not inhabit burrows, hunter success rates can be relatively high. Impacts of improved hunter access by the proposed highway, though, would most likely be limited to areas in proximity to parking areas along the road. Discussions with local snowshoe hare hunters reveal that a real interest in the sport is usually not generated until fairly late in the year (late November - early December), and that by that time the hare's habitat is usually quite inaccessible to all but the most ambitious of hunters. Increased hunter access would be expected to have a minimum effect on snowshoe hare populations beyond the immediate area of the highway facility.

As discussed in Section II.7, field observations, habitat characteristics, and harvest data indicate the project area could support a relatively large population of bobcats. These animals require remoteness and could be significantly impacted by increased human interaction associated with the proposed extension of the Highway. Pocahontas and Randolph Counties have the highest bobcat harvests in West Virginia and increased access provided by the Highway to hunters and trappers could result in increased harvest to the point of permanently reducing the population level of this species.

In summary, the proposed extension of the Highland Scenic Highway would greatly improve hunter access to relatively inaccessible areas and would change land ownership from private to public. These two factors would cause an immediate increase in hunter density, at least in lands immediately adjacent to parking accommodations of the highway. This would result in a greater harvest of game animals and a general depression in their densities on these lands. The extent, in terms of distance from the highway parking areas, and the duration, or permanence, of this effect would depend on many contributing variables and would most likely fluctuate from year to year. Most of the remaining lands would not be impacted to a degree to cause permanent changes in population levels or characteristics of most wildlife species.

The wild turkey population of the project area would be impacted more than most species of wildlife. Sensitive to human disturbance, the wild turkeys would be affected by increased disturbance during both turkey and deer hunting seasons. Dispersal of wild turkeys out of the areas in proximity to the highway and decreases in population densities in these lands would be expected. The physical extent and the degree of impact would vary from year to year.

Increased hunting pressure would have its most significant impact on the black bears of the study area, and a permanent reduction in population levels would be expected. Bobcat populations could also be reduced by increased human interaction and enhanced access for hunters and trappers.

d. Road Kills

Animal deaths on the road are always a potential impact of a highway on new location. The impact is greatest during the period immediately following the opening of the road to traffic and lessens with time as wildlife becomes acclimated to the presence of the road. Because of the purpose of the facility for low speed scenic driving, the Highland Scenic Highway would have less impact than other types of roads.

The white-tailed deer would be the most susceptible large species of the area, and deer kills could be substantial during the initial opening of the roadway to traffic. Wildlife mortality could become aggravated during winter months if deicers are applied to the road surface. The presence of salt would be an additional attraction to deer and to snowshoe hares. The adverse effect of salt application in winter would probably be more than offset by the reduced volumes of traffic during this off-peak season.

Because of the low speed design of the roadway, it is doubtful that black bear road kills would be a problem. Bear mortality on the Skyline Drive in Virginia is practically none and deer mortality averages approximately 100 per year for the entire 105 miles of the drive.[90]

Because of the design of the highway for low speed scenic driving and the relatively low projected traffic volumes, road kills would not be expected to occur at a sufficient level to significantly or permanently affect wildlife populations.

e. Impact on Endangered, Threatened or Rare Species

The extension of the Highland Scenic Highway would have no impact on the two species of bats officially listed as endangered or threatened by the U.S. Department of Interior known to exist in this area of West Virginia: The Indiana bat and the Virginia big-eared bat. The recreation programs for the highway alternatives were developed with an awareness of the presence of the Indiana bat in Cass Cave, and recreational facilities were not planned near the cave.

Other endangered species not known to exist in the area, but for which the habitat may be suitable, include the mountain lion, the Eastern timber wolf and the American peregrine falcon. If these species exist in the project area, the highway may have an impact on the mountain lion and timber wolf because of their requirement for very remote, wilderness-type habitat.

Relatively rare or status unknown species in the project area, or which could find suitable habitat, are the fisher, river otter and the Cheat Mountain salamander. Improved accessibility provided by the proposed highway could increase trapping effort for fishers. Because fishers are relatively easy to trap, this increased trapping pressure could detrimentally affect the fisher population in the study area. Alternative 4 along the Shavers Fork would have the greatest potential for adversely affecting river otters, if any, in fact, exist in the area. The impacts on the Cheat Mountain Salamander, discussed in Section a, would be more beneficial than detrimental because of protection of large amounts of habitat offered by the build alternatives.

f. Summary Discussion and Conclusions

The differences of the proposed scenic highway from other types of highways are conducive to attenuation of the highway's impact on wildlife. Highway features contributing to impact abatement include:

- limited width
- design to follow natural land contours
- low design speed
- minimum disturbance of land surface for cuts and fills
- controlled development along the highway, limited to scenic overlooks and picnic areas
- controlled development of an additional 40.5 to 43.7 thousand acres of land surface through scenic easements.

Thus, for most wildlife species of the area, the impact assessment revealed little difference in impact between the build alternatives and the no-action alternative. The no-action condition also includes construction of access roads for logging and timbering activities and a continuing development trend, although the development process in this area of the State is slower than in some other areas. Because the assessment often resulted in little difference in impact between the build and no-action conditions, many species of wildlife may not be particularly mentioned in the preceeding reported results of the wildlife evaluation. This does not mean the species was forgotten, only that the resulting indication of impact was not substantial.

An environmental assessment must consider both short-term and long-term impacts. A problem in definition often occurs because of the many disciplines involved in this type of study. In biology or ecology, short-term impacts extend will beyond construction activities and long-range impacts may extend over 100 years.

Potential significant impacts of the extension of the Highland Scenic Highway on wildlife are summarized below. There is little difference in impact between the four build alternatives unless otherwise noted.

1. The project would permanently remove 169-193 acres of habitat and temporarily disturb an additional 284-351 acres.

2. Some degree of control and protection of habitat for a variety of wildlife species would be afforded by acquisition of lands in fee and scenic easements on 40,518-52,972 acres. In contrast, under the no-build alternative, there is a likelihood of future degradation of wildlife habitat quality through human development, particularly in the southern portion of the study area.

3. Habitat quality for black bear and turkey would be significantly reduced within 1/4-1/2 mile of the highway (11,000-22,000 acres) with some impact occurring at greater distance. Most of the impact on turkey would occur in the southern part of the study area where about 15% of the available habitat would be severely impacted. Black bear would be affected primarily in the Shavers Fork drainage both by the loss of remoteness due to intrusion of human activity and by disruption of mobility by the presence of the road. Alternatives 1, 2, and 3 would be especially significant in providing a barrier to critical food supplies outside the watershed.

4. Improved hunter access combined with the loss of habitat quality would have a significant impact on the black bear population of the study area. These impacts would be greatest for Alternative 3 and least for Alternative 4.

5. Improved hunter access would place additional stress on resident wild turkeys through increased disturbance during turkey, deer, and other game hunting seasons.

6. Improved hunter and trapper access would most likely increase harvest of the bobcat, possible to the point of permanently reducing the population in the area.

Regulations on the National Environmental Policy Act require that the environmental impact statement's analysis of impact specifically include consideration of irreversible and irretrievable commitments of resources, probable adverse environmental effects which cannot be successfully mitigated, and the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity.

- The loss of 169-193 acres of land paved for highway surface would be, for all practical purposes, an irreversible and irretrievable commitment of wildlife habitat for highway use.

- A reduction in wild turkey and black bear densities in the land adjacent to the proposed highway would be a significant adverse impact not capable of being successfully mitigated while retaining usage of the scenic highway for its intended purpose.

- The use of the environment for construction and use of the Highland Scenic Highway would provide for adequate maintenance of long-term productivity for most species of wildlife and would provide some opportunities for enhancement of habitat where lands were acquired in fee. Long-term productivity of the area for turkey and black bear would be reduced.

- The no-action alternative would provide for maintenance of wildlife productivity if tracts were not subdivided and occupancy improvements not constructed. However, there would be no guarantees that these conditions would be maintained, and it is reasonable to assume that they would not be on private lands in the headwaters of Shavers Fork and the southern project area.

6. Wetlands and Floodplains

There are four designated wetlands within the project area: The beaver ponds at the two headwaters branches of Second Fork; the beaver ponds at the headwaters of the southern fork of Beaver Creek; and an area between Black Run and Slide Run. However, there are many other wetlands in the project area, primarily as a result of beaver activity, which have not been officially designated as such. At the current stage of design of the proposed alignments, no determination can be made regarding impacts to wetlands or floodplains. It appears there would be little problem in avoiding wetland or floodplains encroachment when designing the proposed highway. However, this evaluation would have to be made at a subsequent stage of project design.

7. Air Quality

The following is a summary of potential air quality impacts. Detailed methodologies, calculations and analyses are contained in a technical report supporting this document.[94]

The proposed alternatives for the extension of the Highland Scenic Highway are located in an area which has been designated as an area of attainment of the National Ambient Air Quality Standards (NAAQS) for transportation related pollutants in accordance with the West Virginia State Air Quality Implementation Plan (SIP). National Ambient Air Quality Standards (NAAQS) are shown on Table 71. The location of these alternatives in an area in which NAAQS have been attained significantly reduces many of the concerns related to the air quality of the study area. Since the Highland Scenic Highway would be a scenic and recreationally oriented road, traffic volumes would normally be low and travel the road at only moderate speeds.

By far, the major air quality concerns in the study area are those related to the long range transport of air pollutants into the area from distant sources. Two atmospheric phenomena have distinct manifestations in the Monongahela National Forest. These are the transport of ozone, other photochemical oxidants and sulfur dioxide from sources at far distances from the study area, and the high incidence of acid precipitation. Both phenomena are related to the particular air flow patterns and topographic

TABLE 71

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

The U.S. Environmental Protection Agency (EPA) has established primary and secondary air quality standards in accordance with Sections 108 and 109 of the Clean Air Act as amended. Primary standards are those which, in the judgment of the EPA Administrator, are requisite to the protection of public health. Secondary standards are those which, in the judgment of the EPA Administrator, are requisite to the protection of public welfare from any known or anticipated effects associated with the presence of the pollutant in ambient air.

Pollutant (or Indicator)	Averaging Time	NAAQS (Primary)	NAAQS (Secondary)
Particulate Matter	Annual G.M. 24 hr. max.[a]	75 $\mu g/m^3$ 260 $\mu g/m^3$	60 $\mu g/m^3$ 150 $\mu g/m^3$
Sulfur Dioxide (SO_2)	Annual Avg. 24 hr. max.[a] 3 hr. max.[a]	0.03 ppm 0.14 ppm --	0.02 ppm 0.10 ppm 0.50 ppm
Carbon Monoxide (CO)	8 hr. max.[a] 1 hr. max.[a]	9 ppm 35 ppm	9 ppm 35 ppm
Ozone (O_x)	1 hr. max.[a]	0.12 ppm[b]	0.12 ppm[b]
Hydrocarbons (HC)	6-9 am, max.[a]	0.24 ppm	0.24 ppm
Nitrogen Dioxide (NO_2)	Annual Avg.	0.05 ppm	0.05 ppm
Lead (Pb)	Avg. Per Calendar Quarter	1.5 $\mu g/m^3$[c]	1.5 $\mu g/m^3$[c]

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[a]Not to be exceeded more than once per year.

[b]Federal Register, February 8, 1979.

[c]Federal Register, October 5, 1978.

G.M. - Geometric Mean
$\mu g/m^3$ - Micrograms per Cubic Meter
ppm - Parts per Million

relief of the study area in particular and the Monongahela National Forest in general. As air flows eastward and encounters the increasing elevations of the mountain ranges, heavier constituents are deposited from the air as it is forced upslope. When this air flow is accompanied by precipitation, or becomes precipitation because of the presence of moisture in the air, the discharge of airborne constituents increases. Both dry and wet deposition, i.e., precipitation, are significantly increased along the Allegheny Front because of this combination of air flow and terrain effects.

Acidic precipitation and the deposition of dry photochemcial oxidants and sulfur oxides are of particular concern within the study area because of the existing high level of acidity of many of the soils. The addition of acidity from the atmosphere increases the level of acidic runoff from these soils and further compounds the effects of this runoff in the streams and waters of the area. Both the direct deposition of oxidants and the acidificaiton of soils have incipient effects on the vegetation of the area. All deposited atmospheric constituents do not have injurious effects on vegetation; in fact, many are beneficial. There are, however, sufficient phytotoxicants among the constituents that these effects will remain a concern in the study area.

The proposal to construct the extension of the Highland Scenic Highway through the area, however, would neither favorably or adversely enter into the processes involved in the photochemcial transformation of oxidants or the acidification of precipitation. These processes require basic emissions to enter the atmosphere and during the transport over distance and time, react with sunlight and water vapor to form the air constituents which are of concern. The deleterious effects of these processes are removed both in distance and time from the points at which the original components enter the atmosphere.

a. Air Quality Assessment

An analysis of possible air quality impacts of the proposed extension of the Highland Scenic Highway has been performed. This anlaysis was done in accordance with the Federal Highway Administration's nomographic procedure for estimating carbon monixide (CO) concentrations near highway facilities.[95]

On the basis of the CO analysis performed for both the existing receptors and proposed receptors in the study area, it is concluded that any effects the proposed construction of the extension of the Highland Scenic Highway would have on air quality are very insignificant and that automotive emission levels in the study area would remain well below the National Ambient Air Quality Standards.

b. Air Quality Impacts on Vegetation

Within the study area, several of the vegetative species are those subject to injury from phytotoxic air pollutants. The level of injury which could occur to these species would, of course, be dependent upon many factors, including, the specific pollutants present, dosage-exposure relationships, predisposition of one pollutant by another, and the presence or absence of biotic pathogens. Several of the northern hardwood species, including beech (Fagus sp.), birch (Betula sp.) and maples (Acer sp.) are sensitive to effects of SO_2, ozone, other oxidant air pollutants, and ethylene. Effects on the eastern red spurce have been less investigated, but there is evidence that this species could be injured by phytotoxic air pollutants.

There are no significant point sources of air pollutants in the vicinity of the proposed extension of the Highland Scenic Highway which would have a direct impact upon the vegetation of the area. Volumes of traffic on existing roads within or near the study area are very low and do not emit pollutants in quantities which would cause deleterious effects to vegetation. The construction and operation of the proposed Highland Scenic Highway extension would not increase the amounts of air pollutants in the study area to the extent of causing any adverse effects on vegetation.

The principal concerns for injury to damage to vegetation due to air pollution are those which are associated with long range transportation of ozone and photochemical oxidants as well as the acidification of precipitation. In many respects, the preservation of large natural areas such as the Monongahela National Forest have an important function related to air quality. Areas of this type frequently serve as major sinks for the absorption and deposition of atmospheric impurities, thereby aiding the purification of the atmosphere. The potential for vegetative damage in the project area from the long-range transport of phytotoxic pollutants is a long term impact both in terms of distance and time. Any effects associated with the extension of the Highland Scenic Highway would be of little consequence relative to these considerations.

c. Construction-related Air Quality Effects

Two air quality effects associated with highway construction are the exhaust emissions of construction equipment and air-borne dust due to the disturbance of the ground surface. Present-day highway construction is dependent upon a variety of motorized equipment to perform much of the work required. The use and movement of this equipment contributes to the levels of carbon monoxide, particulates, nitrogen oxides, and hydrocarbons in the environment. Based on the usual number of pieces of equipment and their estimated fuel consumption rates, it can be expected that carbon monoxide levels within the construction area will be raised approximately 2 to 3 ppm during construction operations. In view of the low ambient carbon monoxide levels within the study area, the concentrations due to construction will remain well within the National Ambient Air Quality Standards and their impact upon air quality will be insignificant.

During construction, air-borne particulates increase as dust is raised by construction operations. This impact can be significantly minimized by the use of dust palliatives, such as calcium chloride, and by other dust control measures, such as wetting the exposed earth with water during dry periods. These measures will be included in the standard or special construction specifications largely to assure the health and comfort of those employed at the construction site.

d. Effects on Mandatory Class I Federal Areas

Section 128 of the Clean Air Act Amendments of 1977, Public Law 95-95, establishes, as a national goal, the prevention of visibility impairment from manmade air pollution and the restoration of natural visibility in mandatory Class I Federal areas. Two of these areas are within the Monongahela National Forest. These are the Dolly Sods Wilderness (10,215 acres) and the Otter Creek Wilderness (20,000 acres). Visibility in both of these area would not be affected by the Highland Scenic Highway's construction or operation because of adequate distance between the wilderness areas and the project area to prevent the transport of particulates or other pollutants.

8. Climate-related Impacts

The elevations at which the Highland Scenic Highway is constructed are the highest at which a highway has ever been constructed in the State of West Virginia. On the existing portion, much of the roadway is located at elevations in excess of 4,000 feet and the lowest point, at the crossing of Williams River, is above 3,000 feet. On the proposed extension, the alternatives are often at elevations over 4,000 feet, reaching elevations as high as 4,400 feet. All elevations on the proposed extension would be above 3,000 feet. The construction, operation and maintenance of a highway at these altitudes would be significantly affected by climatic conditions.

Consideration must be given in the design of the pavement, subgrade and other roadway which would withstand the extremes of temperature, frost action and other effects of freezing - thawing actions. Pavement and subgrade of greater depth then provided on highways at lower elevations are normally required to offset these climatic effects.

The construction season at these higher altitudes is also likely to be shortened considerably when severe weather, low temperatures and snow reduces the period of time over the winter months when construction activities can be effectively conducted.

While it is desirable to maintain and operate the Highland Scenic Highway throughout the winter months, because of the heavy snows which occur in these higher altitudes, snow removal and the maintenance of the roadway in safe driving condition would likely be very costly. Even with the maintenance of the highway during winter, there is high probability that there would be periods in which severe snowstorms render the roadway impassable, often for extended periods of time. Because the accummulation of snow during storms at these altitudes can quickly reduce the passibility of the roadway, specific precautionary measures must be provided to ensure the safety of highway users during these periods. These measures must assure that no one is marooned in stalled vehicles when the roadway becomes impassable.

The visibility within the area is often significantly reduced by low-lying clouds at the higher elevations and frequent fogs generally throughout the area. These conditions result primarily from moist air being forced upslope by prevailing air mass movement. The limitations of visibility which can occur would be a factor in attracting people to the Highland Scenic Highway for scenic viewing, tending to reduce the overall number of people who may elect to come to the area as a part of their recreational experience. It is, however, to be reasoned that all recreational experiences are subject to climatical impacts and it would be difficult to assess quantitatively the extent of the probable effect.

With respect to the build alternatives, the probable climate-related impacts would be similar for all of the proposed alternatives. In comparing the build alternatives to the no-build alternative, however, the impacts for the build alternatives are of more concern because of the specific objectives of the Highland Scenic Highway as a recreational and scenic highway. As all-purpose roads, other highways in the area, while subject to many similar climatic-related impacts as the Highland Scenic Highway, are not as critically evaluated within these considerations. On the existing highways generally paralleling the proposed extension of the Highland Scenic Highway, extremely high elevations have been avoided as much as possible. Because these roads are located at elevations often much lower than the Highway Scenic Highway, the climatic-related impacts associated with the higher elevations are reduced on the existing roads.

F. CONSISTENCY WITH NATIONAL, REGIONAL AND LOCAL PRIORITIES

Priorities are best identified through a review of plan and program priorities. Section II.B.10. described a group of plans and programs that affect resources management in the area.

In general, the two county plans and the three regional and state economic development plans/programs contain strongly stated economic goals and objectives that call for increased economic development activities such as infrastructural improvements like the proposed extension of the Highland Scenic Highway. Therefore, the build alternatives are in complete conformity with the goals and priorities established by these plans/programs, and the "no-build" alternative is not in conformity with them.

On the other hand, while calling for strongly coordinated use of all resources, the U.S. Forest Service Plans indicate the need for a high degree of protection and enhancement of the area's natural resources. The build alternative would be more consistent with this goal than the no-build alternative. However, the build alternative is inconsistent with the featured species (black bear) policy in the Upper Shavers Fork which calls for keeping the transportation system at a minimum, controlling traffic to short time periods, and constraining general public vehicular use. It is also inconsistent with the driving for pleasure policy which encourages improvement of existing highways to meet access and scenic needs rather than construction of new high standard routes through undeveloped portions of the Forest. Therefore, both the build and no-build alternatives have consistencies and inconsistencies with the goals and policies found in these plans.

EVALUATION OF ALTERNATIVES

SECTION VI

VI. EVALUATION OF ALTERNATIVES

The process utilized to compare and evaluate alternatives included several steps. The first step in this process was to summarize the results of the impact analysis, by category of impact. Impacts were analyzed by predicting potential changes between future conditions with the proposed extension (build alternatives), and without the proposed extension (no-build alternative, or baseline condition). The impact categories used in Parts A and B of this section relate to evaluation criteria 7 through 15 in Section III. Evaluation criteria 1 through 6 were then used in Part C of this Section.

A. SUMMARY OF IMPACT ANALYSIS

Engineering Feasibility

1. Alternative 4 has the least amount of required excavation, and least distance requiring severe grades.

2. Two problem areas have been identified as having severe engineering characteristics requiring difficult and costly design and construction:

   Buzzard Ridge/Gibson Knob area - Segment A.
   Thorny Flat area - Segment B.

3. Alternative 4 is the least costly to construct ($35.3 million); Alternative 1 would cost the most ($42.1 million).

4. The project would have no significant traffic impacts.

5. The project would have no significant safety impacts.

Suitability for Scenic Highway Purposes

6. The build alternatives are generally equal in the quality of recreation experience provided. Alternatives 1 and 3 offer the highest quality interpretive trails. Alternative 2 offers the lowest quality.

7. Suitability of the alternatives in the visual quality category is 3, 1, 2, 4, No-Build.

8. Alternative 3 is the most suitable for scenic highway purposes.

Project Costs

9. Estimated total project implementation costs are: $60.0 million for Alternative 1; 57.0 for Alternative 2; 61.3 for Alternative 3; 55.8 for Alternative 4.

10. Benefit/costs ratios for those impacts which can be quantified are: 0.651 for Alternative 1; 0.654 for Alternative 2; 0.583 for Alternative 3; and 0.632 for Alternative 4.

Soils and Geology

11. Highly erodible soils would be encountered along each alternative. Alternative 2 has a length of 21.2 miles within erosive soils, Alternative 1 has 20.3 miles, Alternative 4 has 16.4 miles, and Alternative 3 has 13.7 miles, presenting the least erosion hazard.

12. It has been determined that erosion could be successfully mitigated, at costs ranging from $653,450 for Alternative 2 to $1.06 million for Alternative 4.

13. Alternative 2 has the greatest potential for landslide activity, with approximately 8 miles located within landslide hazard areas. The potential for slide activity is nearly the same for Alternatives 1, 3 and 4, ranging from 3.9 to 4.5 miles within hazard areas.

14. Alternative 2 has the greatest potential for impacts associated with limestone bedrock and groundwater.

Employment and Revenue

15. The project would create 82 new year round tourism-related jobs, an additional $2.2 million in total tourism growth including direct wage payments and $150,000 in additional tax income.

16. The project would cause a loss of jobs in the mining industry.

17. The project would cause a loss of 14-40 jobs in the timber industry during a twenty-year period of adjustment in rotation (based on 1980 data).

18. The project would generate 77-89 full time construction jobs annually over the next 10 years, and 4-5 maintenance jobs, an approximate average of $2.2 million in wage payments per year for the next 10 years (1980 dollars).

19. A significant beneficial impact on the local economy would occur through expenditures for fuel, materials, tools; not only in the construction sector, but in the banking, insurance, and trade sectors as well.

20. The project would produce a slight increase in general revenues for Pocahontas and Randolph Counties.

Land Use

21. The project would have a beneficial, long-range impact on land use by increasing the amount of open space/recreation land use.

Social

22. The project would have no significant impact on population or community facilities.

National Radio Astronomy Observatory

23. Alternative 3 would negatively impact the operations at the National Radio Astronomy Observatory by causing interference from vehicle ignition systems. It is estimated the project would contaminate an additional 7% of the total astronomical data.

Water Resources

24. Stream sedimentation during construction would be extremely costly to control. Estimated costs to control erosion range from $653,450 for Alternative 2 to $1.06 million for Alternative 4.

25. The build alternatives would have a beneficial long-range impact on study area water resources by providing control through easement of 40-53 thousand acres of land.

26. Alternative 3 would produce the least short-term impact and have the greatest long-term impact on study area water resources.

Wildlife

27. The project would permanently remove 169-193 acres of habitat and temporarily disturb an additional 284-351 acres. Some degree of control and protection of habitat for a variety of wildlife species would be afforded by acquisition of lands in fee and scenic easements on 40,518-52,972 acres. In contrast, under the no-build alternative, there is a likelihood of future degradation of wildlife habitat quality through human development, particularly in the southern portion of the study area.

28. Habitat quality for black bear and turkey would be significantly reduced within 1/4-1/2 mile of the highway (11,000-22,000 acres) with some impact occurring at greater distance. Most of the impact on turkey would occur in the southern part of the study area where about 15% of the available habitat would be severely impacted. Black bear would be affected primarily in the Shavers Fork drainage both by the loss of remoteness due to intrusion of human activity and by disruption of mobility by the presence of the road. Alternatives 1, 2, and 3 would be especially significant in providing a barrier to critical food supplies outside the watershed.

29. Improved hunter access combined with the loss of habitat quality would have a significant impact on the black bear population of the study area. These impacts would be greater for Alternative 3 and least for Alternative 4. Population levels of the bobcat could also be reduced due to increased human interaction and enhanced access for hunters and trappers.

30. Improved hunter access would place additional stress on resident wild turkeys through increased disturbance during turkey, deer, and other game hunting seasons.

Coal Resources

31. Easement acquisition programs for Alternatives 1 and 2 on Cheat Mountain include the least amount of land containing coal reserves, and avoid most coal reserves along Back Allegheny Mountain. Alternative 3 avoids a portion of Cheat Mountain from north of Snyder Knob to Beech Flat Knob. Alternative 4 avoids much of the coal deposits along Back Allegheny Mountain south and east of First Fork and in the headwaters area of Second Fork.

32. Alternative 4 would have an additional effect on the recovery of coal reserves because of its proximity to the two main haul roads along the Shavers Fork.

33. The selection of a build alternative may induce property owners and miners to accelerate the recovery of coal within the chosen corridor, with the purpose of removing as much of the resource as possible before the extension of the highway is completed.

34. Many of the area's reserves that cannot be economically removed with short-term extraction methods would remain underground. After the extension is constructed, recovery of these reserves would be more costly because of the scenic easement program. Therefore, in the long-term, implementation of a build alternative would inhibit the mining of remaining reserves and thus reduce the potential total coal output of the area.

Timber Resources

35. The greatest impact of the retention management objective would be upon the management of pure red spruce stands. A multicut shelterwood would expose the owner to greater risk in the stand management, reduce stumpage values due to higher logging costs per unit removed, and cause higher forest management costs due to the more intense nature of the harvesting system.

36. The negative impact on spruce management operations would also be felt by several rustic fence mills which are completely dependent upon the red spruce stands in the Shavers Fork drainage area.

37. Management activity in partial retention areas would result in longer than normal rotation periods, increased carrying and logging costs, higher management costs, and removal of smaller than normal volumes.

38. Estimated reductions in sawtimber outputs indicate Alternative 3 would cause the greatest loss (2.350 MMBF/year), and Alternative 2 would cause the least (1.20 MMBF/year).

Grazing

39. Approximately 8 (Alternative 1, 3, 4) to 20 (Alternative 2) acres of grazing/agricultural land would be within the roadway width.

Historic, Cultural, Archeological Resources

40. There would be no unavoidable impacts on historic, cultural or archeological resources of the area.

Air Quality

41. The project would have no significant impact on air quality.

Climate-Related Impacts

42. Climate-related impacts include: special design considerations required because of extreme temperatures; a short construction season; difficult maintenance during winter months; and, reduced visibility from the completed highway because of the common occurrence of fog (estimated 3 days/week).

Energy

43. The build alternatives would use the energy equivalent of 59-76 more barrels of crude oil per day (123,749 x 10^6 to 159,433 x 10^6 BTU) than the no-build alternative in the year 2005, an increase of 78%.

Visual Resources

44. The project would have both positive and negative impacts as related to the visual resources of the area.

Tourism

45. The project would increase visitor volume by 165,000 annually, and visitor expenditures by $1,650,000 annually. Additional benefit would accrue from the fact that the additional volume would occur principally during periods when existing hotels and supporting facilities are underutilized, resulting in higher efficiency with minimal additional investment.

46. The project would improve the quality of the road network for inter- and intra-regional travel, shortening access time to major attractions by about 15 minutes and ameliorating safety hazards on existing roads. Alternative 2 would provide most direct and uncomplicated access to Snowshoe Ski Resort, the most highly developed existing area attraction.

47. The project would open up previously inaccessible back country, creating new opportunities for dispersed and concentrated recreation. However, once access is provided to previously inaccessible areas, return to undeveloped area is not easily achieved.

Of the nineteen impact categories initially considered, there were fourteen categories where substantial impacts are projected to occur. These are identified as follows:

1. Engineering Feasibility
2. Suitability for Scenic Highway (Recreation)
3. Project Costs
4. Soils and Geology
5. Employment and Revenue
6. Land Use
7. National Radio Astronomy Observatory
8. Water Resources
9. Wildlife
10. Coal Resources
11. Timber Resources
12. Climate-Related Impacts
13. Energy
14. Tourism

B. COMPARISON OF BUILD ALTERNATIVES

Selecting a build alternative before comparing the build/no-build options serves to further define the build condition for this subsequent comparison. Of the eleven impact categories, only five exhibit significant differences among the four build alternatives. These categories, and the ranking of each alternative from best (1) to worst (4) as related to impacts within each category are shown below:

		ALTERNATIVE			
	CATEGORY	1	2	3	4
1.	Project Cost (Benefit/Cost Ratio	2	1	4	3
2.	Suitability as Scenic Highway	2	3	1	4
3.	National Radio Astronomy Observatory	1	1	4	1
4.	Timber Industry	1	2	4	3
5.	Soils and Geology	3	4	3	3

In a final evaluation of the proposed alternatives, Alternative 4, while having many attributes including lower implementation costs and ease of construction, lacks the suitability in fulfilling the purposes and functions of a scenic highway that the other alternatives provide. In the analyses, Alternative 4 ranked lowest in visual quality and had the lowest benefit/cost ratio. This alternative also presented the greatest long-term potentially adverse impact on water quality/resources. Thus, Alternative 4 was eliminated from further consideration. Alternative 3 was eliminated because of high costs, adverse impacts on the NRAO, potentially adverse impacts on the timber harvesting and coal mining industries and the proximity of its location to the Cass Scenic Railroad, which as a property on the National Register of Historic Places may be adversely affected. The locations of Alternatives 1 and 2 differ for only a short distance, from Gibson Knob to northeast of Mace Knob, with the differences in potential impacts being quite small.

For this reason impacts of Alternatives 1 and 2 were reviewed again for all original fourteen categories:

CATEGORY	IMPACTS ALTERNATIVE 1		IMPACTS ALTERNATIVE 2
1. Engineering Feasibility	Requires 4.7 million C.Y. of excavation, 0.4 miles with grades greater than 8%. Difficult design in Segment A at Buzzard Ridge, and Segment B at Thorny Flat.		Requires 4.7 million C.Y. of excavation, 0.7 miles with grades greater than 8%. Difficult design in Segment A at Buzzard Ridge. Avoids problem at Thorny Flat.
2. Suitability as Scenic Highway	Contains 13 overlooks, 2 picnic areas, 4 opportunities for high quality interpretive trails. Ranks second in suitability for viewing outstanding scenery.		Contains 11 overlooks, 3 picnic areas, 3 opportunities for interpretive trails. Ranks third in suitability for viewing outstanding scenery.
3. Project Costs			
Acquisition	$15,527,000		$15,711,000
Construction and Engineering	42,091,000		39,021,000
Reclamation	542,000		542,000
Recreation	1,120,000		1,083,000
Erosion Control	773,000		653,000
Total	$60,053,000	(5.3% more than Alt. 2)	$57,010,000
Benefit/Cost Ratio	0.651		0.654

	ALTERNATIVE 1	ALTERNATIVE 2
4. Soils and Geology	20.3 miles in erosive soils; 4.8 miles in landslide hazard; 20.5 miles affecting limestone. Does not cross limestone terrain.	21.2 miles in erosive soils; 8.0 miles in land slide hazard; 22.8 miles affecting limestone. Crosses limestone terrain for a distance of 1.3 miles.
5. Employment and Revenue	These benefits would be the same for all alternatives.	Same as Alternative 1.
6. Land Use	Beneficial impact by increasing amount of open space/recreation use.	Same as Alternative 1.
7. National Radio Astronomy Observatory	Interference would cause contamination of additional 7.0% total astronomical data.	Interference would cause contamination of additional 0.01% total astronomical data.
8. Water Resources	Construction-related impacts include potential erosion and sedimentation of Elklick Run and the Shavers Fork headwaters, not significantly affected by Alt. 2. Estimated costs to control erosion are estimated to be $772,850, 18% higher than Alt. 2. Less potential for groundwater impacts. Offers better access to the Shavers Fork for fishing and other water-related recreation. Includes 40,518 acres in easement program, 16,948 within the Shavers Fork watershed.	Construction-related impacts include potential erosion and sedimentation of Big Spring Fork and the Tygart Valley River headwaters, not significantly affected by Alt. 1. Estimated costs to control erosion are estimated to be $653,450. Greatest potential for groundwater impacts. Offers no access to Shavers Fork for fishing and other water-related recreation. Includes 40,594 acres in easement program, 12,893 within the Shavers Fork watershed.

	ALTERNATIVE 1	ALTERNATIVE 2
9. Wildlife	Affects more black bear and snowshoe hare habitat, 6.25 miles greater distance through high density population areas than Alt. 2.	Affects more deer and grouse habitat, 9.1 miles greater distance through high density population areas than Alt. 1.
	Provides greater increase in hunter access to previously remote areas.	Provides less increase in hunter access to previously remote areas.
	Crosses an area of known population of Cheat Mountain salamander near Thorny Flat, but also includes this area in future easement control.	Avoids crossing the Thorny Flat area, but also lacks future control through easement.
10. Coal Resources	Would inhibit the extraction of coal resources remaining after construction.	Same as Alternative 1.
11. Timber Resources	Would require that timber be managed on longer rotation periods; reduction of 1.25 MMBF/year in sawtimber output for a 20 year period.	Would require that timber be managed on longer rotation periods; reduction of 1.20 MMBF/year in sawtimber output for a 20 year period.
	Affects more red spruce timber.	Affects less red spruce timber.
12. Climate-related Impacts	Very little difference.	Very little difference.
13. Energy	Total energy usage is estimated to be 381,570 x 10^6 BTU annually in the year 2005.	Total energy usage is estimated to be 363,459 x 10^6 BTU annually in the year 2005, 5.2% less than Alt. 1.

	ALTERNATIVE 1	ALTERNATIVE 2
14. Tourism	Increase in visitor volume by 165,000 annually, and $1,650,000 in visitor expenditures annually.	Same as Alternative 1.
	Would provide less direct access to Snowshoe Resort, but would stimulate visitation by providing a better view of the resort facilities.	Would provide most direct access to Snowshoe Resort.
15. Legality	Designed in compliance with requirements of Public Law 93-87, Section 161, and other applicable Federal, State, and local laws, regulations, and policies.	Same as Alternative 1.

In summary, Alternatives 1 and 2 are approximately equal in potential impacts related to land use, coal resources, employment and revenue, water resources, and climate. Alternative 1 offers major advantages in the areas of suitability as a scenic highway and soils and geology impacts. Alternative 2 offers a major advantage in engineering, and slight advantages in effects related to the National Radio Astronomy Observatory, tourism, timber, energy, project costs, and wildlife. While Alternative 1 is indicated as being of greater advantage than Alternative 2 with respect to the distance of location through landslide-prone areas and areas of erodible soils, Alternative 2 avoids the section through Thorny Flat which represents a number of undesirable features associated with the alignment and grade from an engineering viewpoint. The measures necessary to construct this portion of Alternative 1 are far greater than any measures which may be encountered on Alternative 2 on the corresponding connecting section. Based on this analysis, Alternative 2 would be the most desirable of the four build alternatives.

C. COMPARISON OF BUILD VS. NO-BUILD OPTIONS

None of the potential adverse impacts identified for the preferred build alternative, Alternative 2, are considered of a severity to preclude extending the Highland Scenic Highway. The decision of whether or not to implement the proposed extension will have to be based upon whether sufficient benefits can be provided by the proposed extension to justify project costs. The decision will have to take into account benefits and costs both in quantitative and qualitative terms.

The decision of whether to extend the highway must consider the planning history of the facility as a whole and consider whether the intersection of the completed section with U.S. Route 219 provides a logical terminus for the facility. Originally the Highland Scenic Highway was intended to extend from its beginning

in Richwood to U.S. Route 50 near, Mount Storm, intersecting many major access routes and providing 160 miles of scenic and recreational experiences. The planning for the highway, however, has changed with time, and the present authorization, Public Law 93-87, limits the location of the Highland Scenic Highway to existing routes north of the terminus of the section being considered in this study at U.S. Route 250. Forty-five miles of the Highland Scenic Highway are currently considered to be in existence; the first twenty-three miles of this highway follow existing State Route 39, redesignated as Route 150 from Richwood to the Cranberry Mountain Visitor Center. The remaining twenty-two miles are on new location from Route 39 to U.S. Route 219. Relative to the Highland Scenic Highway as a whole, a valid question is whether 22 miles as now exists, or 57 miles, including the 35 miles provided by Alternative 2, should be on new location.

Another factor which must be taken into consideration is the limitation placed on the characteristics of the proposed extension and on the study by specific stipulations in the authorizing legislation, Public Law 93-87, Section 161. These stipulations limit the range of alternatives and the permitted usage of the facility. The purpose of the study has been to determine the desirability and feasibility of extending the highway within the definitions indicated in Public Law 93-87. The selection of the no-build alternative in this study would not preclude subsequent study of additional alternatives of varying characteristics.

The preferred build alternative, Alternative 2, permanently removes 171 acres of wildlife habitat and disrupts an additional 495 acres of habitat. Through the acquisitions of lands in fee and scenic easements, however, 40,594 acres (including 3,347 acres already under U.S. Forest Service control) would be provided with a degree of control and protection of habitat for a wide variety of wildlife species. With the no-build alternative, there is no assurance that development and human activity within the project area would not be of level exceeding that which the preferred alternative would provide. The southern portion of the study area has the greater potential for development and activities which would be disruptive to wildlife habitat.

The decision between the preferred build alternative and the no-build alternative requires specific evaluation of the following criteria, as established in Section III (Criteria 1 through 6):

1. Ability to meet selected National Forest and Appalachian Forest objectives and priorities.

   The preferred build alternative may be considered to have slightly greater ability to meet selected objectives and priorities of the Monongahela National Forest and the Appalachian National Forests in the near future. Since the acquisition of the Shavers Fork watershed has been designated a priority in the Forest Plan, it is possible that it will eventually be acquired under no-build conditions. The principal difference, then, is one of time since it is likely that acquisitions in the Shavers Fork area would occur much sooner with the build alternative.

2. Ability to meet project objectives.

The no-build alternative does not have the ability to meet specific objectives of extending the highway. The preferred alternative, Alternative 2, complies with these project objectives.

3. Compatability with management plans of the Monongahela National Forest and the Shavers Fork Sub-Unit.

While calling for strongly coordinated use of all resources, the management plans for the Monongahela National Forest and the Shavers Fork Sub-Unit indicate the need for a high degree of protection and enhancement of the area's natural resources. The preferred build alternative is most immediately compatible to these management plans because it offers long-range protection of natural resources through the scenic easement acquisitions program. Although eventual acquisition of the Shavers Fork watershed by the Federal government for inclusion in the National Forest System is possible with the no-build alternative it remains questionable when this acquisition is likely to occur.

The build alternative is basically inconsistent with the featured species policy for black bear in the Upper Shavers Fork which indicates the transportation system should be kept to a minimum, controlling traffic to short time periods, and constraining general public vehicular use. The build alternative is also inconsistent with the driving for pleasure policy which encourages improvement of existing highways to meet access and scenic needs rather than construction of new high-standard routes through undeveloped portion's of the Forest. In summary, both the build and no-build alternatives have both consistencies and inconsistencies with the Forest Service management plans.

4. Ability to contribute to national, regional and local goals and planning.

In general, the two county plans and the three regional and state economic development plans or programs contain strongly-stated economic goals and objectives that call for increased economic development activities that would include the proposed extension of the Highland Scenic Highway. The build alternative is in conformity with the goals and priorities established by these plans and programs. The no-build alternative is not in conformity to the plans and programs.

The Statewide Comprehensive Outdoor Recreation Plan (SCORP)[38] for 1980-1985 discusses several unresolved issues which impact upon the outdoor recreation interests of the State of West Virginia. One of these issues is the Highland Scenic Highway. The concerns expressed in regard to the Highland Scenic Highway were:

a. Increased access in this section of the State would encourage the development of high density use areas. This high density use would result in a major change in the types of outdoor recreation opportunities currently available. The Highland Scenic Highway could be beneficial to West Virginia's tourism program comparable to those benefits associated with the Skyline Drive and Blue Ridge Parkway.

b. Construction of the Highland Scenic Highway would reduce opportunities for dispersed forms of recreation, i.e. hunting and fishing and a result in reduced habitat, one of the few remaining, for black bear, turkeys and fisheries that exist in the Shavers Fork Watershed. Construction activity could result in sediment loads that would reduce the biological productivity of the Shavers Fork Watershed.

c. Shavers Fork has been identified as a potential wild and scenic river. In the Presidential Environmental Message of August 2, 1979, all federal agencies were directed to avoid or mitigate adverse effects on rivers identified in the National Inventory. The U.S. Forest Service was also directed to assess whether rivers located on lands under their control and identified in the inventory were suitable for inclusion in the system. Prompt action was to be taken to assure the protection of rivers suitable for inclusion in the system.

d. Road construction activity could impact the existing DNR Bald Knob Overlook.

e. The terminal point of the Highland Scenic Highway is in question since earlier proposals discussed the extension of the Highland Scenic Highway in the vicinity of U.S. Route 33 and/or Corridor H.

The Statewide Comprehensive Outdoor Recreation Plan (SCORP)[38] recommended two strategies relative to the resolution of the issues related to the Highland Scenic Highway. These were:

a. That the final termination point and location of the Highland Scenic Highway be determined with proper consideration given to environmental impacts and economic analysis reports.

b. The environmental and/or economic impact studies, as well as engineering analysis, should consider the alternative of improving access to the area through upgrading of the existing U.S. Route 219 corridor.

With reference to the recommended SCORP strategies, the alternatives presented in this statement provide for the accomplishment of neither of these goals. The first strategy will require an ultimate destination such as Gormania or a specific location on Corridor H. With

regard to the objective of the second strategy, within the objectives and criteria established for this study, the possibility of upgrading the U.S. Route 219 corridor has been viewed only as a no-action, or, no-build alternative. To fully assess and evaluate the use of the U.S. Route 219 corridor for the extension of the Highland Scenic Highway would require additional studies which have been indicated to be beyond the level of the current study.

5. Compatibility with public opinion and agency recommendations.

Compatibility with public opinion and agency recommendation cannot be fully assessed until after the Draft Environmental Impact Statement is circulated with the results of the impact analysis. Commentors are then informed of the potential impacts in all categories. Early coordination has resulted in expressed concerns, primarily in the areas of project costs, project need, water resources, energy and wildlife. There have been strong opinions expressed both in opposition to, and in support of, the proposed extension of the Highland Scenic Highway. There is, however, no clear single position of support or opposition of the project, nor is there likely to be one. There has been support of the proposed extension voiced because of perceived economic and recreational benefits.

IDENTIFICATION OF
FOREST SERVICE
PREFERRED ALTERNATIVE

SECTION VII

VII. FOREST SERVICE PREFERRED ALTERNATIVE

A. DECISIONS TO BE MADE

Two decisions are necessary to satisfy the purpose of this study:

1) Whether the Forest Service recommends that the Highland Scenic Highway should be extended as a parkway to U.S. 250 near Barton Knob as authorized by Section 161 of Public Law 93-87. The Congress has the final authority to decide whether to extend the Highway as authorized; and,

2) Which corridor the Forest Service would prefer if the Highway is to be extended.

Based on the analysis and evaluation of the alternatives discussed in this draft, the Forest Service preferred alternative is not to extend the Highway to U.S. 250 as a parkway. If the final decision is made to extend the Highway as authorized, Location Alternative 2 (Cheat Mountain) is preferred over the other build alternatives.

B. RATIONALE FOR DECISIONS

1. <u>Reasons for Preferring the No-Action Alternative</u>

The decision not to support the extension of the Highway to U.S. 250 was made primarily for the following reasons.

a. The estimated costs for construction, land and easement acquisition, recreation development, and reclamation exceed the anticipated benefits.

b. Although most adverse environmental impacts of construction could be successfully mitigated, some impacts, particularly to wildlife habitat, could not be avoided.

c. Although development of the project could provide some environmental benefits through land use control and reclamation, it has not been demonstrated that the No-Action Alternative would necessarily result in sufficiently adverse impacts to justify the extension.

In making this decision, it is recognized that extension of the Highway could provide some significant public benefits:

a. Increased opportunity for the driving public to view outstanding scenery with minimal distractions from residential or commercial development.

b. Expanded opportunities for driving for pleasure and viewing outstanding scenery complementing the extensive and varied recreation opportunities and facilities, particularly in Pocahontas County.

c. Stimulation to local and regional economies in the short run resulting from construction employment and in the long run from added tourism.

d. Long-term environmental protection associated with public control of water quality, restrictions on development of presently undeveloped areas, and reclamation of areas disturbed by surface mining in past years.

However, several detrimental aspects of the proposed extension support a recommendation that the Highway not be extended as proposed.

a. It is most difficult to justify the expenditure of $55.8 to $61.3 million for construction of a recreational highway which would contribute little to local or regional transportation needs.

b. Construction and use of the Highway would significantly impact wildlife habitat, particularly that for black bear and wild turkey. Impacts to black bear habitat, particularly in the Upper Shavers Fork watershed, could not practically be mitigated.

c. The benefits of spectacular long-range views are diminished by frequent conditions of poor visibility and by the fact that several existing development in the area offer similar opportunities.

d. Although most risks of impacts to water quality can be mitigated through road design, adequate construction specifications, and stringent supervision and enforcement, total avoidance of significant adverse impacts cannot be guaranteed.

e. Construction of a highway for the primary purpose of recreational driving is not consistent with national goals to reduce oil consumption. This consideration would have less relevance for a road that also satisfied local or regional transportation needs, provided significant fuel economy, or met other significant local, regional, or national demands.

In making this decision, the following assumptions have been made concerning the consequences of the No-Action Alternative:

a. Present trends in land ownership and use within the study area will continue during the foreseeable future: Both deep and surface mining of coal under applicable state and

federal regulations will proceed in and adjacent to the Shavers Fork Watershed until commercial reserves are exhausted; timber harvest will proceed on private land subject to voluntary compliance with Best Management Practices; corporately owned land in and near the Shavers Fork Watershed will remain in large tracts, but many of the private tracts outside that area will be subdivided and/or developed for residential, recreational, or tourist related purposes including considerable second home development and development of the Snowshoe Resort complex will continue.

b. Habitat for turkey and black bear will generally be maintained where mining and timber harvest occur intermittently, but will deteriorate where continual human activity is prevalent.

c. Some adverse impacts to water quality related to surface disturbance by mining and access road construction will continue to occur. However, existing environmental controls and the completion of mining and transportation system will result in a reduction of these impacts.

The impacts of the No-Action Alternative are not anticipated to be sufficiently adverse to justify the considerable expense of the project. In fact, habitat for turkey and bear would be better under the No-Action Alternative except in areas of occupancy-type development, and some additional commercial activity which would be permitted will have local economic benefits.

Adoption of the No-Action Alternative would not necessarily preclude extension of the Highland Scenic Highway under different legislative authorization. Three such possibilities have been identified during the course of this study, all of which fail to meet one or both legislative criteria of management for passenger cars only and terminating at U.S. 250 near Barton Knob as required by P.L. 93-87.

These possibilities are:

a. Designating U.S. 219 northward to some undetermined point as a part of the Highland Scenic Highway.

b. Extending the Scenic Highway approximately 10-20 miles to connect to U.S. 219 somewhere between Linwood and the headwaters of the Tygart Valley River.

c. Extending the Scenic Highway approximately 17 miles to connect to state routes in the vicinity of Cass.

Detailed consideration of these possible routes is beyond the scope of this study due to the use and destination limitations of P.L. 93-87. However, certain advantages and disadvantages of each have been identified in a preliminary manner and are summarized on page VII-5. A separate study would be needed to determine the feasibility and desirability of these possible routes. Appropriate changes in legislation would be necessary before any decision to designate or construct one of these routes could be implemented.

2. Reasons for Preferring Alternative 2, If Built

The Cheat Mountain Alternative is the preferred location if the Highway is extended because it represents the best compromise of costs, benefits, and adverse impacts of the four build alternatives.

Alternatives 3 and 4 (The Back Allegheny and Shavers Fork Alternatives) were rejected for the reasons stated in Section VI. It should be noted that Alternative 3 is rated as the most desirable location in terms of suitability for a scenic highway and it has the second lowest construction costs (although higher acquisition costs more than offset this). The principal reasons for rejecting this alternative are the serious adverse impacts on the National Radio Astronomy Observatory and on the operation of the Cass Scenic Railroad.

Alternatives 1 and 2 rank very closely in most respects as discussed in Section VI. Alternative 2 is preferred primarily because of its lower costs, significantly better engineering feasibility (by avoiding the Thorny Flat area), and because it would cause less adverse impact on bear habitat and would avoid potential for significant water quality impacts in the headwaters of Shavers Fork. This alternative would also permit the best opportunities for stage construction by connecting to State Route 9 near U.S. 219 at Linwood, whereas Alternative 1 would intersect narrow graveled portions of Routes 9 and 1/3 about 13 miles from U.S. 219.

In identifying this preference, several drawbacks to Alternative 2 have been recognized. It is considered to be somewhat less suitable for a scenic highway, crosses through slightly more area of erosive soils and significantly more landslide-prone areas, and it could affect more limestone areas which would increase the risk of groundwater impacts. Development near the proposed location between the headwaters of Big Spring Fork and Mace Knob would detract from the scenic quality and the Highway itself would create visual impacts on the view from private property and U.S. 219 near Linwood. Special attention would be necessary in design and construction to minimize the impacts of the highway in these areas.

PRELIMINARY ANALYSIS

POSSIBLE EXTENSIONS OUTSIDE EXISTING AUTHORIZATIONS

Description	Advantages	Disadvantages
Designation of U.S. 219 as part of Highland Scenic Highway	Scenic Highway standards could be incorporated when and if U.S. 219 is improved.	Potential conflicts with existing or proposed developments including residential areas.
	Relatively little acquisition needed.	Relatively few significant views.
	Relatively little new construction.	Not consistent with highland nature of the Scenic Highway.
	Lower cost.	Potential conflicts between recreational and commercial traffic.
	Relatively little impact on wildlife and water resources.	
Extension to northerly terminus with U.S. 219	Would provide extended recreation facility.	Would include difficult construction near Gibson Knob.
	Includes several outstanding viewing opportunities	Potential limestone/groundwater impacts.
	Shorter travel distance to Linwood/Snowshoe by about five miles.	Impact on turkey habitat.
	Minimal impact on bear habitat.	Includes less scenic Big Spring Fork to Mace Knob section.
	No impacts on Shavers Fork.	Visual impacts of Highway itself.
Extension to Cass	Would provide extended recration facility.	Possible impact on NRAO (Green Bank).
	Several outstanding viewing opportunities.	Would include difficult construction at Gibson Knob.
	Would avoid Big Springs - Mace Section.	Potential limestone/groundwater impacts.
	Would connect major scenic, recreational, and educational sites.	Impact on turkey habitat.
	Would complement Cass Scenic Railroad.	
	Relatively little bear habitat.	
	No impact on Shavers Fork.	

CONSULTATION
WITH OTHERS

SECTION
VIII

VIII. CONSULTATION

Consistent with NEPA process, U.S. Forest Service rules and regulations, and sound engineering and planning practice, many opportunities have been presented to involve the public, as well as other public and private agencies and concerns in the study and environmental analysis of the extension of the Highland Scenic Highway. Working Paper No. 1[96] outlined the procedures and methodology for involving these individuals and groups in the study. The following procedures were utilized to involve the public.

1. Early coordination letters were sent to potentially interested agencies, individuals and organizations during the middle of October, 1979.

2. A formal notice of intent to undertake the study was published in the December 20, 1979, Federal Register.

3. Three newletters were developed and widely distributed in December of 1979, August of 1980 and January, 1981.

4. Two public information meetings were held on January 2 and 3, 1980, in Mill Creek and Marlinton, respectively.

5. A local public participation coordinator, Dr. James Van Gundy, Chairman of the Department of Environmental Science at Davis and Elkins College, was added to the study team in February of 1980.

6. Two Public Participation Working Groups were organized by Dr. Van Gundy and met a number of times in 1980 and 1981 to review the study's progress.

7. Media coverage, particularly through local newspapers, has occurred throughout the study.

8. Many individuals and agencies were afforded the opportunity to comment on the various aspects of the study through the ongoing consultation process between the study team and those from which information and data were being sought.

Those agencies, groups and organizations consulted during the Highland Scenic Highway Study include:

U.S. Department of Interior
- Bureau of Land Management
- Heritage Conservation and Recreation Service - Northeast Region
- Fish and Wildlife Service - Northeast Region
- Office of Surface Mining - Washington D.C.
- Office of Surface Mining - Region 1
- National Park Service - Regional Office

U.S. Department of Agriculture
Soil Conservation Service - State Conservationist
Forest Service - Regional Office
Forest Service - Monongahela National Forest
Environmental Protection Agency - Regional Administrator
U.S. Army Corps of Engineers
U.S. Department of Transportation
Federal Highway Administration - Region 15
U.S. Congress
Senate: Robert C. Byrd & Jennings Randolph
House of Representatives: Harley O. Staggers
Appalachian Regional Commission
Ohio River Basin Commission
Ohio River Valley Water Sanitation Commission
National Wildlife Federation
West Virginia Wildlife Federation
The Wildlife Society, Inc.
The National Audubon Society
The Ruffed Grouse Society
The National Wild Turkey Federation
The Wild Turkey Federation - Mid Ohio Valley
Sierra Club - Potomac Chapter
West Virignia State Historic Preservation Officer
West Virginia Department of Culture and History
West Virginia Department of Natural Resources
Cass Scenic Railroad
Division of Parks and Recreation
Water Resources Division
Director's Office
Division of Wildlife Resources
Heritage Trust
Edray Fish Hatchery
West Virginia Department of Highways
Governor's Office of Economic and Community Development
Director of Planning
Director, Travel Development Division
West Virginia Air Pollution Control Commission
Region 4 Economic & Development Council
Region 7 Economic & Development Council
League of Women Voters
Geological & Economic Survey
West Virginia Bear Hunters Association
West Virginia Gardens Clubs, Inc.
West Virginia Snowshoe Hare Association
Izaak Walton League of America - West Virginia Division
Izaak Walton League of America - Mountaineer Chapter
Izaak Walton League of America - Cherry River Chapter
West Virginia Forests, Inc.
West Virginia Scenic Trails Association
West Virginia Coal Association
Trout Unlimited - West Virginia Council

Trout Unlimited - Mountaineer Chapter
Trout Unlimited - Kanawha Valley Chapter
Nature Conservancy
National Radio Astronomy Observatory
The Highlands Conservancy
Potomac Appalachian Trail Club
Potomac Highland Travel Council
New River Travel Council
Brooks Bird Club
Chessie System
State Legislature
    Delegate: Joseph E. Martin, III
    Senate: Jae Spears & Carl E. Gainer
Pocahontas County
    Planning Commission
    Commissioners Office
    Citizens Committee
    Farm Bureau
Randolph County
    Planning Commission
    Commissioners Office
Town of Marlinton
Town of Durbin
City of St. Albans
Marlinton Chamber of Commerce
Richwood Chamber of Commerce
Snowshoe Company
Mower Lumber Company
Myles Lumber Company
Interstate Lumber Co.
Beckwith Lumber Co.
R.S. Burruss Lumber Co.
Marlinton Motor Inn
El Poca Motel
The Hermitage
Mountain Top Fuel Co.
Newera Resources, Inc.
Fassifern Farms, Inc.
Private property owners and individuals

List of Agencies, Organizations, and Persons to Whom Copies of the Draft Environmental Impact Statement are Being Sent

U. S. Department of Agriculture
Soil Conservation Service, USDA
Forest Service, USDA - Northeast Forest Experiment Station
Forest Service, USDA - Northeast Area (State and Private Forestry)
U. S. Environmental Protection Agency
U. S. Environmental Protection Agency - Region III
U. S. Department of Transportation
Federal Highway Administration - Region 15
Federal Highway Administration - West Virginia Division
U. S. Department of Energy
U. S. Department of Interior
Office of Surface Mining, USDI - Region I
Fish and Wildlife Service, USDI - Region 5
U. S. Army Corps of Engineers - Pittsburgh District
U. S. Army Corps of Engineers - Huntington District
Ohio River Basin Commission
Appalachian Regional Commission
National Radio Astronomy Observatory
State Clearinghouse (Governor's Office of Economic and Community Development)
West Virginia Department of Natural Resources
West Virginia Department of Highways
West Virginia Geological and Economic Survey
West Virginia University
Region IV - Planning and Development Council
Region VII - Planning and Development Council
Pocahontas County Commission
Randolph County Commission
Nicholas County Commission
City of Marlinton
City of Durbin
City of Elkins
City of Richwood
Marlinton Chamber of Commerce
Elkins Chamber of Commerce
Richwood Area Chamber of Commerce
Pocahontas County Citizens Committee
Potomac Highland Travel Council
New River Travel Council
Izaak Walton League of America - West Virginia Council
Izaak Walton League of America - Mountaineer Chapter
Izaak Walton League of America - Cherry River Chapter
Sierra Club - West Virginia Chapter
West Virginia University SPIRG
Trout Unlimited - West Virginia Council

Trout Unlimited - Kanawha Valley Chapter
West Virginia Coal Association
National Audubon Society - West Virginia Chapter
The Nature Conservancy
Wild Turkey Federation - West Virginia Chapter
West Virgiñia Wildlife Federation
West Virginia Forests, Inc.
League of Women Voters
West Virginia Highlands Conservancy
West Virginia Bear Hunters Association
Potomac Appalachian Trail Club
Mower Lumber Company
Snowshoe Resort, Inc.
Fassifern Farms
CSX
Myles Lumber Company
Beckwith Lumber Co.
New Era Resources, Inc.
Mountain Top Fuel Company
Davis and Elkins College - Department of Environmental Science
Davis and Elkins College Library
West Virginia University Library
Elkins-Randolph County Library
Richwood Library
Honorable Jennings Randolph
Honorable Robert C. Byrd
Honorable Cleve Benedict
Honorable Mick Staton
Honorable Jae Spears
Honorable Carl E. Gainer
Delegate Charlie Jordan
Delegate Joseph E. Martin, II
Delegate Robert E. Goff
Delegate Larry A. Tucker
George McLaughlin
Charleston Gazette
Charleston Daily Mail
Pocahontas Times
Elkins Intermountain
Morgantown Dominion-Post
Beckley Post-Herald
Nicholas County Newsleader
Pocahontas Communications Coop
WWVU-TV

Responses to Comments on the Draft E.I.S.

The following agencies, organizations, and persons commented on the Draft EIS. Copies of their letters and responses to comments are included on the following pages.

	Date of Reply
Jeannette Fitzwilliams	October 15, 1981
George McLaughlin	October 15, 1981
Trout Unlimited, National Director	October 16, 1981
Woodlands Institute	October 16, 1981
West Virginia Department of Culture and History	October 16, 1981
U.S. Forest Service, Northeast Forest Experiment Station	October 20, 1981
West Virginia Department of Highways	October 22, 1981
Dave Sharp	October 25, 1981
University of Virginia, Department of Environmental Sciences	October 29, 1981
Jeannette Fitzwilliams	November 8, 1981
F. Henry Sipe	November 18, 1981
U.S. Department of Commerce	November 18, 1981
U.S. Environmental Protection Agency, Region III	November 24, 1981
U.S. Department of Transportation, Office of Environment	November 25, 1981
Wild Turkey Federation, Mid-Ohio Valley Chapter	No-Date
West Virginia Snowshoe Hare Association, Inc.	December 3, 1981

	Date of Reply
Flexible Pavements Council of West Virginia	December 3, 1981
John W. Shiley	December 9, 1981
U.S. Soil Conservation Service, West Virginia State Conservationist	December 23, 1981
Trout Unlimited, West Virginia Council	December 29, 1981
U.S. Army Corps of Engineers, Pittsburgh District	December 31, 1981
Sierra Club, West Virginia Chapter	January 3, 1982
U.S. Army Corp of Engineers, Huntington District	January 5, 1982
National Audubon Society, Mid-Atlantic Region	January 5, 1982
Salem College, Department of Natural Science	January 13, 1982
West Virginia Highlands Conservancy, Scenic Areas Committee	January 13, 1982
Bardwell E. Montgomery	January 15, 1982
U.S. Department of the Interior	January 25, 1982
West Virginia Department of Natural Resources	January 26, 1982

Monongahela National Forest
P. O. Box 1548
Elkins, West Virginia 26241

October 15, 1981

Your review and comments are invited on the enclosed Draft Environmental Impact Statement for Extension of the Highland Scenic Highway (West Virginia Route 150) from U. S. Highway 219 to U. S. Highway Route 250. Comments received by January 15, 1982, will be considered in preparation of the Final Environmental Impact Statement.

Two public meetings have been scheduled to provide an opportunity for public discussion of the proposal and Draft Environmental Impact Statement:

Elkins	Tuesday, November 17, 1981 Davis and Elkins College Room 400, Science Center	7:30 P.M.
Marlinton	Wednesday, November 18, 1981 Municipal Building	7:30 P.M.

Written or oral comments will be accepted at these meetings or comments may be submitted by mail.

R. F. Mumme
RALPH F. MUMME
Forest Supervisor

Mr. Mumme: 10/15/81:
I received a copy of "Highland Scenic Highway Study" today and my comments are listed below:

1 1. Page VII-5, Possible extensions outside existing authorizations: I believe it makes good sense to designate U.S. 219 as part of Highland Scenic Highway. I have traveled from Marlinton to Oakland, Md. on U.S.219 in the past week, and the scenery and colored trees take your breath. An improved U.S.219 would allow for places to pull off to look at the scenery, and would allow for passing lanes going up mountains, or be 4 lane so you could pass safely at any time. As you travel from Elkins to Parsons, 2 miles from Parsons, the mountains are in full color, more so than anywhere I have seen.

George McLaughlin

Response to:
George McLaughlin

1. If existing legislation, which limits alternatives, is revised, U.S. Route 219 could be considered in future studies. At the present time, there is no indication that P.L. 93-87 will be revised.

TROUT UNLIMITED

Box 235
Alloy, WV 25002
October 16, 1981

Mr. Harry B. Mahoney
Monongahela National Forest
P.O. Box 26241
Elkins, West Virginia 26141

Dear Mr. Mahoney:

I was delighted to hear that the Forest Service has recommended that the Highland Scenic Highway not be extended beyond Route 219. It is a shame that this project was not stopped many years ago before so much money was wasted. West Virginia does not need and cannot afford any new roads in the Monongahela National Forest.

I have enclosed a copy of my 'etter of June 4, 1969 to Frederick A. Dorrell who was the Supervisor of the Monongahela National Forest at that time. I tried to point out a few of the many problems that this highway was creating.

Sincerely,

Ernest E. Nester
National Director

/scm

Enclosure

THE ACTION ORGANIZATION
Washington D.C. Headquarters • 118 Park Street S.E. • Vienna Virginia 22180 • (703) 281-1100

Response to:
<u>Trout Unlimited, National Director</u>

No response necessary.

Box 298
Alloy, West Virginia 25002
June 4, 1969

Mr. Fredrick A. Forrell, Supervisor
Monongahela National Forest
Elkins, West Virginia 26241

Dear Sir:

The Highland Scenic Highway has not been in the news very much for a couple of years now but I want to let you know that there are a few cranks like myself who feel that this road is not good for West Virginia in the long run. I realize that you have inherited this road and probably had no connections with the politicians who conceived and brought about the funding of this wilderness devouring highway.

1 It seems to me that the Highland Scenic Highway was developed without any comprehensive planning, foresight or imagination. It is silly to build another "scenic" highway when the Monongahela National Forest is already criss-crossed with scenic highways such as Routes 39, 15, 219, 250, 28, 33 and 4. What can be more scenic than Route 39 from Richwood to Mill Point or Route 250 from Huttonsville to Virginia? What West Virginia needs is good roads connecting with the surrounding states and not more local roads.

2 I have wondered why this highway is called the Highland Scenic Highway when the type of vehicles is not going to be restricted in any way. This highway will certainly make logging of the affected areas of the National Forest a lot easier. Also, it is an open invitation for companies who own the mineral rights to open up mining operations in areas that were not accessible before. I am afraid that the Highland Scenic Highway will result in the deteoriation of the natural environment of the Monongahela National Forest.

What is the status of the Allegheny Parkway at this time? I am having difficulty in obtaining any information on this project.

Sincerely,

Ernest E. Nester

EEN:js

Response to:
<u>Trout Unlimited, National Director (cont'd)</u>

1. As discussed in Section IV.A, existing roadways outside of the specified project area cannot be considered as alternatives for the extension of the Highland Scenic Highway unless the criteria used to establish the project alternatives is altered or modified.

2. As discussed in Section IV.A, the proposed Highland Scenic Highway would be limited to only scenic and recreational use, and passenger car travel. In addition, Section V.D discusses the proposed easement restrictions placed on mining and timber harvest operations in the study area.

WEST VIRGINIA
DEPARTMENT OF CULTURE AND HISTORY
JOHN D. ROCKEFELLER IV, GOVERNOR
NORMAN L. FAGAN, COMMISSIONER

October 16, 1981

Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, W.Va. 26241

Re: Draft EIS, Highland Scenic Highway Extentions, Pocahontas & Randolph Counties, West Virginia.

Dear Mr. Mumme:

We have reviewed the pertinent sections of the Draft Environmental Impact Statement for the proposed extentions of the Highland Scenic Highway. We have found the draft to be satisfactory in most respects. We of coarse had initial imput into the documentation.

1 There is one small omission, however. In the sites listed on the National Register, as reported on page II-46 of the document, the Cass Historic District is omitted. This historic district, which was entered on the National Register on November 28, 1980, is within the project area and should, therefore, be considered. A U.S.G.S. topographical map showing the boundaries of the historic district in red is enclosed for your information.

Thank you for the opportunity to comment on this matter. Please keep us advised of any and all developments in this matter as they relate to cultural resources.

Sincerely,

Rodney Collins

Rodney S. Collins, Director
Historic Preservation Unit

enclosure

RSC/mjp

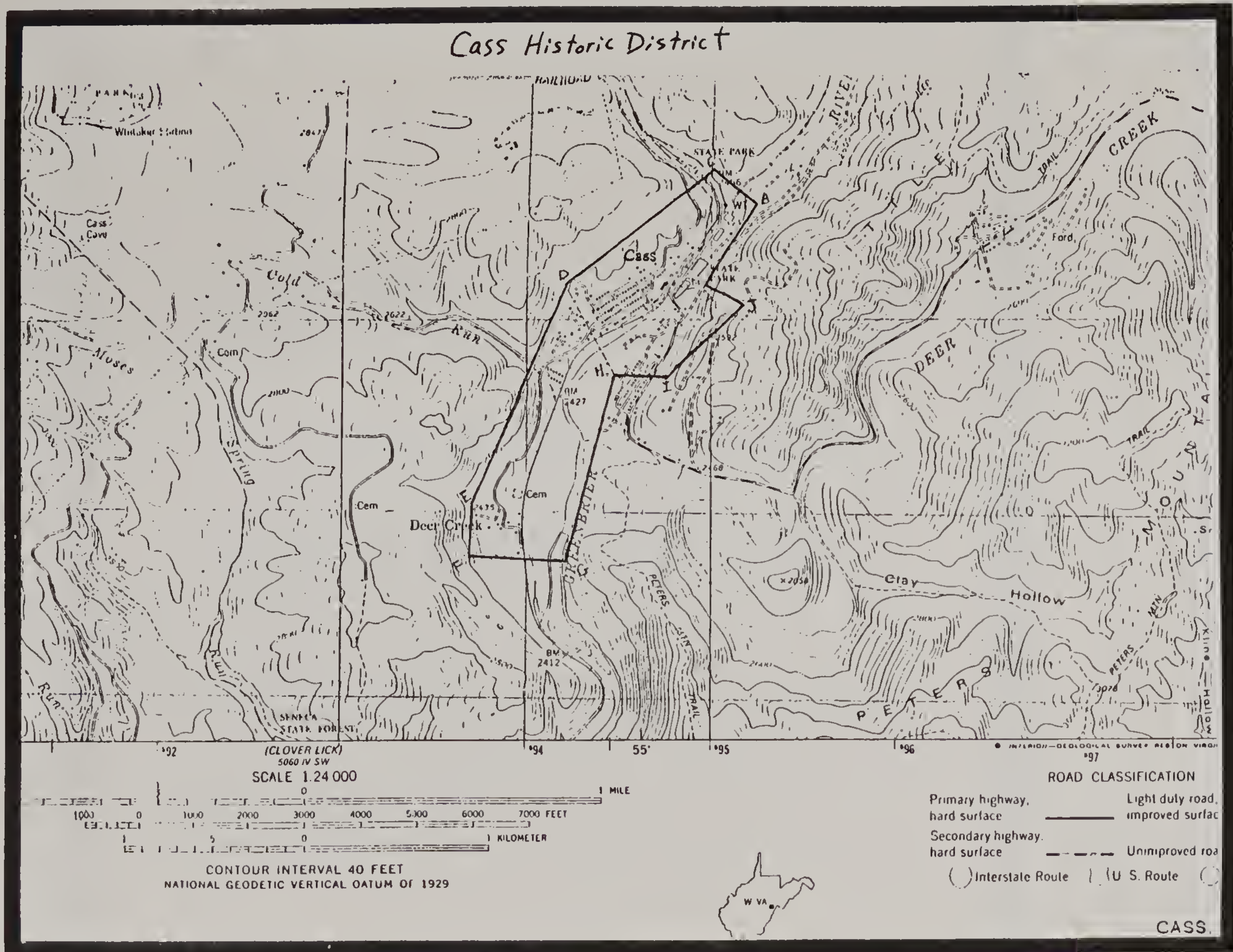
THE CULTURAL CENTER / CAPITOL COMPLEX / CHARLESTON, WEST VIRGINIA / 25305 / 304•348•0220

Response to:
West Virginia Department of Culture and History

1. The Cass Historic District of Pocahontas County is recognized as being entered on the National Register of Historic Places and is hereby added to Table 24 on page II-46. This historic site would not be impacted by the construction of any of the build alternatives.

Response to:
<u>West Virginia Department of Culture and History (Cont'd)</u>

No response necessary.



Mr. & Mrs. Dave Sharp
4171 Paxton Woods Drive
Cincinnati, Ohio 45209

October 25, 1981

Monongahela National Forest
P. O. Box 1548
Elkins, W. Va. 26241

Dear Sirs: Reference--Scenic Highway extension.

I own poperty of my family's old home place in Pocahontas county and I'm interested in the welfare and benefit of Pocahontas county.

I am also interested in wasted energy, natural resourses, forests, ecology and in not spending funds unnecessarily.

I am strongly opposed to the extension of the Scenic Highway.

Considering the gasoline situation--50% dependance on foreign supplies, we have to be realistic about the future and the probability of this proposed road becoming a monster white elephant. !

1 I am enclosing clippings of letters to the Pocahontas Times, along with a map of the area with comments on it. Please consider the important issues reported in these papers.

Finally, this proposed road that closely parallels route 219 is not necessary and gives no benefits, except the few, very few, tourists who might travel the present scenic road and might see a little more of the same !

P. S. The greatest use of it would be by local residents who would have an alternate road to travel to Elkins, thus leaving the present route 219 to be ignored and neglected by both the residents and the upkeep of the road !

Sincerely,

Dave Sharp
Dave Sharp

Please present my plea to the Elkins and Marlinton meetings.

Response to:
Dave Sharp

1. These clippings out of the Pocahontas Times were printed in January and February, 1981, and for the most part state reasons against the building of the Highland Scenic Highway. The map suggests that the proposed highway should follow existing U.S. Route 219, which is discussed in Section IV.A of this report.

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230

NOV 18 1981

Mr. Harry B. Mahoney
Highland Scenic Highway Coordinator
Monongahela National Forest
P. O. Box 1548
Elkins, West Virginia 26241

Dear Mr. Mahoney:

This is in reference to your draft environmental impact statement entitled "Monongahela National Forest, Pocahontas & Randolph Counties, West Virginia." The enclosed comment from the National Oceanic and Atmospheric Administration is forwarded for your consideration.

Thank you for giving us an opportunity to provide this comment, which we hope will be of assistance to you. We would appreciate receiving four copies of the final environmental impact statement.

Sincerely,

William B. [illegible] for

Robert T. Miki
Director of Regulatory Policy

Enclosure: Memo from Joyce M. Wood
Office of Ecology and Conservation
NOAA

Response to:
<u>U.S. Department of Commerce</u>

No response necessary.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md 20852

October 21, 1981

TO: PP/EC - Joyce M. Wood

FROM: OA/C5 - Robert B. Rollins

SUBJECT: OEIS 8110.20 - Highland Scenic Highway Study (West Virginia Route 150 from US Route 219 to US Route 250) Pocahontas & Randolph Counties

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

1 Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments. For further information about these monuments, please contact Mr. John Spencer, Director, National Geodetic Information Center (OA/C18) or Mr. Charles Novak, Chief, Network Maintenance Branch (OA/C172), at 6001 Executive Boulevard, Rockville, Maryland 20852.

10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration
A young agency with a historic tradition of service to the Nation

Response to:
U.S. Department of Commerce (Cont'd)

1. Because the no-build is the selected alternative, the build alternatives have been eliminated from further consideration or study.

FLEXIBLE PAVEMENTS COUNCIL OF WEST VIRGINIA

DEAN BLAKE
Executive Director

Division of the Contractors Association of West Virginia
2101 Washington Street, East
Charleston, West Virginia 25311
(304) 342-1166

December 3, 1981

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P. O. Box 1548
Elkins, West Virginia 26241

Dear Mr. Mumme:

After reviewing the Draft Environmental Impact Statement for the Highland Scenic Highway, it is our opinion that Alternative 2 should be approved and developed further as the recommended alternate. As indicated in the Draft EIS, Alternative 2 is the preferred build alternative. Although the Draft EIS goes on to select the no-build alternate as the preferred alternative for the entire study, we feel that many of the problems pointed out in the draft EIS can be solved during the design and construction process.

The study indicates that the estimated cost for construction, land acquisitions, recreational development, reclamation and mitigation of other adverse effects could exceed the benefits projected for the proposed project. It should be noted that tourism in West Virginia is now a billion dollar industry. Completion of the Highland Scenic Highway as orginally proposed could only add to this already substantially growing industry in West Virginia. There are certainly costs which must be incurred but the long-term benefits that could be derived from those costs, in our opinion, outweigh the outlays required for construction.

1 The Draft EIS further states that since the highway would be a scenic highway designed for recreational use, little benefits would be provided to local or regional transportation needs. The limitation placed upon the highway by Public Law 93-87 is not an indelible one. Since this limitation seems to be the major source of controversy, it is our suggestion that the matter be brought once again to the attention of Congress and that action be urged which would allow the Highland Scenic Highways to be used a multiple-use facility, as first planned. This change alone would remove several, if not all, of the arguments which state that the cost associated with the highway outweigh the benefits that can be derived from it.

Response to:
Flexible Pavements Council of West Virginia

1. At the present time there is no indication that specifications of P.L. 93-87 will be changed.

Mr. Ralph Mumme
Page 2

Selection and approval of the no-build alternative carries with it a rather dramatic, negative end to a study which has been pursued with much interest in the State of West Virginia. While it is recognized that funds may not be readily available for immediate implementation of the project, it must also be remembered that planning is a continuing process. Should Alternative 2 be selected and approved, design studies must still be completed. During the design phase, project engineers can still work to assure that adverse impacts associated with construction of the highway are kept to an absolute minimum.

2 The state of the art for mitigation of adverse environmental impacts has advanced tremendously in the last decade alone. With the time that would be required to complete design of the Highland Scenic Highway, such advancements and mitigations will surely continue to develop. Therefore, any associated impacts could be dealt with in an acceptable manner. Again, it is our feeling that the selection of the no-build alternative, while it may adress the immediate concerns of certain individuals, does not speak to the long-term goal that is in the best interest of West Virginia.

The construction industry is willing to stand behind a strong effort to remove the limitations that Public Law 93-87 placed on the Highland Scenic Highway. It is felt that this positive approach to completion of the highway rather than a no-build approach is preferable.

The Flexible Pavements Council is a division of the Contractors Association of West Virginia, a non-profit trade association. The association represents more than 450 firms who are involved directly in the construction industry in West Virginia and surrounding states.

We appreciate the opportunity to review the Draft Environmental Impact Statement and hope that our comments will be given considerable consideration prior to the final decision.

Kindest regards,

Dean Blake
Dean Blake

Response to:
Flexible Pavements Council of West Virginia (Cont'd)

2. The DEIS recognized that adequate means of mitigating most project related impacts are presently available.

United States Department of Agriculture

Soil Conservation Service

75 High Street, Room 301
Morgantown, West Virginia 26505

Subject: 220-0 - ENVIR COORD - Draft EIS for Highland Scenic Highway by U.S. Forest Service

Date: December 23, 1981

To: Ralph F. Mumme
Monongahela National Forest
P.O. Box 1548
Elkins, West Virginia 26241

We appreciate the opportunity to review and comment on the above subject Draft EIS. The report is well prepared and written, we also concur in the "no-build" alternative. The only possible comment we could
1 make concerns your using only the K-factor as the sole factor in determining soil erodibility. In some cases the slope is just as important.

Sincerely,

Craig M. Right

Craig M. Right
State Conservationist

The Soil Conservation Service is an agency of the Department of Agriculture

SCS-AS-2
10-79

Response to:
<u>U.S. Soil Conservation Service, West Virginia State Conservationist</u>

1. Slope was a factor included in assessing and identifying the location of erosion - prone areas associated with each alternative.

Sierra Club in West Virginia

805 West Burke Street
Martinsburg, West Virginia 25401
January 3, 1982

Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
PO Box 1548
Elkins, WV 26241

Dear Mr. Mumme:

The Sierra Club's West Virginia Group wholeheartedly endorses the No-build Alternative recommended in the Highland Scenic Highway Study Draft Environmental Impact Statement. We agree that the proposed extension to the Highland Scenic Highway would disrupt one of the few areas in West Virginia still suitable for black bear, bobcat, wild turkey and snowshoe hare. We agree that the highway would encourage consumption of scarce petroleum resources. We agree that the highway would be expensive, and that the benefits to local residents would fall far short of the cost to the nation's taxpayers. We agree that the land acquisition program accompanying a Build Alternative would provide some protection for the land adjacent to the highway, but we believe that this land can and should be protected even without the highway. We agree that the Build Alternative is likely to spur a "coal rush" into the area; we are very much afraid that the effects might be permanent in these fragile watersheds.

All in all, the Highland Scenic Highway Study DEIS is very thorough, and leaves little room for improvement. We do have a few comments, however:

1 p. V-28 The cost per ton of deep-mined coal vs. strip-mined coal should be mentioned.

2 p. V-29 Relative figures for rotation periods and operating costs would be very helpful, even if they are rough approximations. Relative value of harvested timber should be estimated, too. Without figures this section is of little use.

3 p. V-46 Benefits and costs should be discounted at a realistic rate; 4% seems rather low. Even if the discount rate to be used in the final accounting is mandated, cost/benefit ratios could be computed using discount rates of 5%, 7% and 10% for reference.

4 p. V-93 Estimates of impact on the bear population, comparable to those given for turkey on p. V-94, are needed.

Sincerely,

John Ostrowski
West Virginia Group Chairman

"Not blind opposition to progress, but opposition to blind progress"

Response to:
Sierra Club, West Virginia Chapter

1. Because of the many variables involved, estimated average costs of deep-mining verses strip-mining would be of limited value and would vary as per the particular characteristics of a site.

2. Because the concept of visual management is relatively new, necessary lengths of rotation periods and operating costs for maintenance of visual quality objectives cannot be quantified.

3. The discount rate utilized was developed by experienced economists in cooperation with U.S. Forest Service personnel.

4. Data on bear movement in the project area is insufficient to quantitatively define a zone of influence.

Salem College

SALEM, WEST VIRGINIA 26426

13 January 1982

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
Elkins, West Virginia 26241

Dear Mr. Mumme:

1 I have reviewed the "Highland Scenic Highway Study Environmental Impact Statement" regarding the Cheat Mountain salamander. I have one concern about the various alternative highway route proposals. After many hours in the field studying the Cheat Mountain salamander, I am convinced that it is nearly impossible to predict where a population will occur. For example, in my report to the Forest Service in 1978, I showed 20 populations of the salamander in 136 sites surveyed. Since this report was submitted, I have done surveys for the United States Office of Surface Mining and Enviro Energy, Inc. This work increased the total number of sites surveyed to 176 and the total of _P. nettingi_ populations to 27. When I survey an area I leave no stone, limb, etc. unturned. This is absolutely the only true means of determing if the salamander is present. I found in surveying proposed haul road sites that the salamander may not be present at one end of the road but may be present in the middle or at the opposite end. What I am suggesting is that a systematic survey needs to be done on all alternative routes, not to turn every stone, etc., but to certainly examine more sites than I had an opportunity to do previously. As I review my notes, I find that I examined just 18 sites in the area in question. In my opinion, this is not adequate to determine the location of all _P. nettingi_ populations that may be present in this area.

I trust you will accept my comments as simply a concern for protecting the salamander and not a criticism of the Forest Service. I respect you and your staff too much to ever be anything but supportive of your efforts.

In this same manner, I would like to mention an additional concern that I have in regard to the Cheat Mountain salamander. I have noticed that the Forest Service frequently builds roads within the known _P. nettingi_ range. I trust thorough surveys are conducted before roads are constructed. If this is not the case, I would ask that you consider such surveys before future Forest Service roads are constructed.

I appreciate the opportunity to comment on these matters, and if I can ever be of any service, please do not hesitate to contact me.

Sincerely yours,

Thomas K. Pauley

Thomas K. Pauley
Chairman and Professor
Department of Natural Science

Response to:
Salem College, Department of Natural Science

1. Because the no-build is the selected alternative, no additional studies of the build alternatives are anticipated.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 81/2212

JAN 25 1982

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, West Virginia 26241

Dear Mr. Mumme:

This is in response to the request for the Department of the Interior's comments on the draft environmental statement for Highland Scenic Highway (Extension of SR-150 from US-219 to US-250), Monongahela National Forest, Pocahontas and Randolph Counties, West Virginia.

ENVIRONMENTAL STATEMENT COMMENTS

General

Notwithstanding the several comments appearing hereafter, we wish to compliment the Forest Service for this outstanding document. The contents are succinct, yet comprehensive. The excellent graphics, charts and table greatly facilitated the review and a thorough understanding of the project proposal, the alternatives, the resources involved and the impacts.

The draft statement is generally adequate in addressing the impacts on environmental facets that are within the areas of special expertise and jurisdiction of this Department. The following comments are offered for your consideration in developing the final statement.

Hydrologic Resources

1 Page II-4: We would note that pH is not a direct measure of acidity (or alkalinity), as is inferred in the third paragraph, but is a measure of hydrogen ion activity (H+). Water with a pH of 7.0 is neutral, i.e., it is neither acid or basic. However, water with a pH of 7.0 can and normally does have both acidity and alkalinity. Water with a pH less than 4.5 has zero alkalinity and water with a pH greater than 8.3 has zero acidity.

Page II-77: The foregoing comment also applies to items 3 and 4.

Response to:
U.S. Department of the Interior

1. It is recognized that pH is a measure of hydrogen ion activity and not a direct measure of acidity (or alkalinity).

Mr. Ralph F. Mumme 2

2 Pages II-78, V-61, V-63 through V-71, V-79, V-80: Pollutants can also enter the subsurface drainage system through faults and fracture zones. The Greenbrier Limestone Group underlies all four alternate routes in their entirety. Therefore, the potential of groundwater contamination exists along all four alternate routes, thus possibly contaminating springs and water wells tapping the Greenbrier Limestone Group down gradient from the point where the pollutant enters the subsurface drainage system. This could happen nearby or many miles away.

Since this limestone formation crops out in the Elk, Greenbrier, Shavers Fork, and Tygart Rivers drainages, surface waters in these streams may be affected by contaminated groundwater discharging from the outcrops, thus broadening the area of possible contamination of streams from nearby to many miles away.

3 Page II-79: The second paragraph should recognize that there were also private-individual water wells contaminated in the vicinity of the Edray Fish Hatchery.

Mineral Resources

The statement fails to evaluate the amount of coal impacted by the build alternatives in the Shavers Fork Basin (Alternatives 1 through 4). Because of the timeframe and present economic conditions, we suspect that an acceleration of mining would not recover a significant portion of the coal (primarily, high quality metallurgical and steam coal) in the impacted area prior to highway construction. Therefore, if a build alternative were to be selected, the above mentioned points should be clarified in the final statement by a more detailed coal resources evaluation and an appraisal for potential extraction of the coal reserves prior to any highway construction.

Historical and Cultural Resources

4 The final statement should address the type of the impacts from the build alternatives on the historic sites discovered in the Phase I archeological reconnaissance along with the measures which will be taken to minimize harm. The statement also should describe the nature of the additional archeological work which would be undertaken.

In the event a build alternative is pursued, information on these sites, as described in DOT ORDER 5610.1C, should be included in a Section 4(f) statement pursuant to the Department of Transportation Act [49 U.S.C. 1653(f)].

The selection of a build alternative should entail close coordination with the West Virginia State Historic Preservation Officer: Mr. Norman L. Fagan, Commissioner, West Virginia Department of Culture and History, State Capitol Complex, Charleston, WV 25304 (phone: 304-348-0220). The final statement should report the results of that coordination including his comments and recommendations for protection of the historic resources.

Wild and Scenic Rivers

As noted in the draft statement (page II-64), Shavers Fork of Cheat River is included in the Final List of Potential Wild, Scenic and Recreational Rivers which have been

Response to:
U.S. Department of the Interior (Cont'd)

2. Comments on potential groundwater impacts are noted and are hereby incorporated into the FEIS.

3. Contamination of private wells, located in the vicinity of the Edray Hatchery, is hereby included in this discussion on previous impacts caused by the construction of the existing Highland Scenic Highway.

4. Because the no-build is the selected alternative, the build alternatives have been eliminated from further consideration or study of potential impacts.

5 considered under the criteria of the National Wild and Scenic Rivers Act (Public Law 90-542, as amended). This list constitutes the results of the Nationwide Rivers Inventory. Identified are natural and undeveloped rivers and river segments that meet the minimum criteria for further study and/or potential inclusion under the Wild and Scenic Rivers Act.

The involved segment of Shavers Fork is in Randolph County and extends 51 miles from Faulkner to the headwaters above Spruce. This segment has been identified for its recreational value, due to the variety of Class 3-4 rapids, and its nearly 90% undeveloped and inaccessible nature. Alternatives 1, 3, and 4 could thus have severe impact on those recreational values. In the event of the selection of one of these build alternatives, we recommend further coordination with the National Park Service about potential impacts to this river.

Recreational Resources

The proposed scenic highway is addressed in the West Virginia Statewide Comprehensive Outdoor Recreation Plan (1979), although more site-specific project planning has altered the original proposal. At the current time, the build alternatives do not impact the Cass Acquisition Project associated with the federally-assisted purchase by the Town of Cass through the Land and Water Conservation Fund (Project #54-00169). Should any of the build alternatives be altered in scope, potential impacts to this Cass recreational resource would require reevaluation and coordination with the State Liaison Officer for Outdoor Recreation: Mr. Fred Cutlip, Office of Economic and Community Development, Building 6, Charleston, WV 25313 (phone: 304-348-3361).

6 Borrow/Spoil Areas

For the build alternatives, the statement should indicate where borrow material would be secured and where excess spoil would be deposited. The statement should describe the borrow/spoil areas under preproject conditions, particularly in relation to flora, fauna, hydrologic and cultural resources. Impacts of the borrow/spoil operations should be identified and mitigation measures to be employed at these sites should be discussed.

ENDANGERED SPECIES ACT COMMENTS

The U.S. Fish and Wildlife Service (FWS) advises that it appreciates the consultations which occurred during your scoping process and that the statement is adequate as it relates to endangered and threatened species.

7 FISH AND WILDLIFE COORDINATION ACT COMMENTS

The statement appropriately describes existing fish and wildlife resources and evaluates, in a general way, project construction impacts. It also recognizes the need for Section 404 permits to implement the build alternatives and for consultation with FWS about the permit applications. The statement, however, lacks adequate information (site-specific location, design and measures to minimize harm) for a full understanding of how the 404 action may impact fish and wildlife resources. Therefore, FWS reserves the right to provide further evaluation and comments when it reviews the permit applications.

Response to:
U.S. Department of the Interior (Cont'd)

5, 6, and 7. See response No. 4.

Based on its understanding of what may occur, FWS advises that its tentative position would be to concur to permit issuance with such stipulations as are deemed appropriate upon permit application review.

As soon as site-specific information is available for a build alternative, FWS would be pleased to cooperate and coordinate with you, the Corps of Engineers, the Federal Highway Administration, the West Virginia Department of Highways, the West Virginia Department of Natural Resources, and others in resolution of all factors, including stipulations, relating to the needed permits.

SUMMARY COMMENTS

Due to the adverse environmental impacts and for the several other reasons enumerated in Chapter VII of the draft environmental impact statement, the Department of the Interior supports the Forest Service's selection of the No-Build Alternative as the recommended action for the proposed extension of the Highland Scenic Highway (W.Va. Rt. 150) from U.S.-219 to US-250.

In the event a build alternative is selected or if you explore Highland Scenic Highway extensions outside of existing authorizations, this Department would be willing to work with you and to provide technical assistance. For technical assistance regarding fish and wildlife resources, please contact the Area Manager, U.S. Fish and Wildlife Service, 1825 Virginia Street, Annapolis, Maryland 21401 (phone: FTS 922-4197). For technical assistance concerning cultural and recreation resources including wild and scenic rivers, please consult with the Regional Director, Mid-Atlantic Region, National Park Service, 143 South Third Street, Philadelphia, Pennsylvania 19106 (phone: FTS 597-7013). For matters pertaining to the project's impact on the mineral resources, please contact the Chief, Eastern Field Operations Center, U.S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh, Pennsylvania 15213 (phone: FTS 721-8500). Questions on hydrologic resources should be directed to the U.S. Geological Survey, District Chief, Water Resources Division, Federal Building and U.S. Courthouse, 500 Quarrier Street - East, Charleston, West Virginia 25301 (phone: FTS 924-1300).

We appreciate the opportunity to review the draft environmental statement for the Highland Scenic Highway and hope that these comments will be of assistance.

Sincerely,

Bruce Blanchard

Bruce Blanchard, Director
Environmental Project Review

Response to:
U.S. Department of the Interior (Cont'd)

No response necessary.

STATE OF WEST VIRGINIA
DEPARTMENT OF NATURAL RESOURCES
CHARLESTON 25305

JOHN D. ROCKEFELLER IV
Governor

January 26, 1982

DAVID C. CALLAGHAN
Director
WILLIS H. HERTIG, JR.
Deputy Director

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
Post Office Box 1548
Elkins, West Virginia 26241

Dear Mr. Mumme:

The Highland Scenic Highway Study Draft Environmental Impact Statement for the extension of West Virginia Route 150 from U. S. Route 219 to U. S. Route 250 has been reviewed by the West Virginia Department of Natural Resources.

We strongly concur with the study's conclusion that the No-Build Alternative is the preferred alternative. Any of the build alternatives will result in significant adverse environmental impacts.

The Department of Natural Resources Wildlife Division's comments relating to wildlife as discussed in the Draft Environmental Impact Statement and Terrestrial Wildlife Evaluation are attached for your consideration. If a decision would be made to go with a build alternative, we would like to reserve the option to provide specific comments on the environmental impacts.

Thank you for the opportunity to review this document.

Sincerely,

David C. Callaghan
Director

DCC/smg

cc: Environmental Protection Agency
U. S. Fish and Wildlife Service
Environmental Review Team

Response to:
West Virginia Department of Natural Resources

No response necessary.

WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES

WILDLIFE RESOURCES DIVISION COMMENTS

Regarding

HIGHLAND SCENIC HIGHWAY STUDY DRAFT ENVIRONMENTAL IMPACT STATEMENT

And

HIGHLAND SCENIC HIGHWAY STUDY TERRESTRIAL WILDLIFE EVALUATION

Highland Scenic Highway Study Draft Environmental Impact Statement

General Comments

As discussed in earlier meetings, the Wildlife Resources Division feels some wildlife information was improperly analyzed and/or presented. Comments were provided both to you and your consultants in April of 1981. Few of our recommendations were incorporated. Subsequently, the Wildlife Division is obligated to reiterate many of these earlier comments as failure to do so would indicate concurrence.

Specific Comments

Page I-1; C.; number 5 -- The term "excessive" is meaningless without proper definition.

Page II-57; para. 5; sent. 3 -- This sentence should be altered to read: "Woodcocks, wood ducks and mallards are present throughout the nesting, brood-rearing and migration periods."

Page II-58; para. 1; sent. 1 -- Add "... in West Virginia" to the end of the sentence.

Page II-58; para. 1; sent. 8 -- This statement implies that densities of 8-10 bears per square mile are commonplace. These density estimates were calculated while observing bear concentrations associated with

Response to:
<u>West Virginia Department of Natural Resources (Cont'd)</u>

The U.S. Forest Service does not disagree with the substance of these comments. They are included here to inform reviewers, and will be considered specifically if further study is determined to be necessary. However, they do not appear to affect the final decision made on this study. Copies of the review comments on the Terrestrial Wildlife Evaluation have been attached to file copies of this document and are available for public review.

Salmon runs in coastal Alaska. This is certainly not comparable to upland situations in eastern United States.

Page II-58; para. 1; sent. 9 -- Add "... in West Virginia."

Page II-59; para. 3; sent. 6 -- Change "... rabbit ..." to hare.

Page II-61; para. 3; sent. 4 -- While grouse densities in this area are below the maximum densities recorded in the literature, references to carrying capacity are inappropriate.

Page II-74; para. 2; sent. 3 -- Add brook trout.

Page V-91; para. 2; sent. 5 -- Researchers have demonstrated that an individual field can provide brood-rearing habitat for most of the turkeys over a wide area.

Page V-92; b. -- The more road mileage in area (following topography), the more wildlife-human interaction. Low speed limits serve to increase the amount of time an individual vehicle will be in a given area. The only positive effect of reduced speed is in regard to direct mortality which does not apply to the "wildlife barrier" discussion. Wildlife species sensitive to disturbance (e.g. black bear) do not react to individual vehicle/human contact based on a road user's motive. The sensitivity of many species to vehicles/roads has evolved as a conditioned response that is reinforced by uninformed individuals that intentionally harass wildlife.

Page V-93; para. 1; sent. 4 -- For most of the species mentioned, this sentence is incorrect. Carrying capacity is the maximum number of individuals that a given unit of area supports at a given time.

Page V-94; para. 4; sent. 4 -- This statement does not consider illegal hunting, dog training, and nonhunting harassment fostered by increased access of the proposed highway. The assumption that bears

2

would immediately lose fear of human contact through prohibition of legal hunting in West Virginia is unsupported.

Page V-95; para. 4; sent. 5 -- This statement is without basis or support by West Virginia's data. It infers that game populations are depressed by sport hunting. West Virginia's deer herd growth is an obvious example of the contrary. Deer populations in Tyler County (extensive road network) have increased from less than 10 deer per square mile to over 50 deer per square mile in less than 15 years under continuous sport hunting.

Page V-97; para. 4; sent. 3 -- This statement is not cited nor is it supported by the experience of this Division. The Shavers Fork drainage immediately north of Route 250 has many roads and excellent trapper/hunter access. Bobcats are plentiful and the area supports a high sustained harvest.

Page V-97; para. 5; sent. 3 -- See earlier comments re: hunting pressure.

Page V-98; paras. 1 and 2 -- See earlier comments re: hunting pressure.

Page V-99; f.; Summary and Conclusions -- See earlier comments regarding low speed and "wildlife barriers" and other points affecting conclusions.

Page VI-3; no. 29 -- Refer to earlier comments.

3

The following letters require no response.

October 15, 1981

Ralph Mumme
Monongahela National Forest
P.O.Box 1548
Elkins, WV 26241

Dear Ralph:

Thanks for sending me the news release on the Scenic Highway.

Congratulations on the stand you have taken. Hope we can make it stick.

Sincerely

Jeannette

Jeannette Fitzwilliams

P.S. The enclosed will tell you what I am up to these days. I have the blessing and promise of cooperation from the Forest Service, D/I, and Corps Engineers & TVA. Now if I can only get some cooperation from the trail users, maybe we can go somewhere.

Would any of your staff like to join NH (in their personal capacity as volunteers) and work on any of the topics. I could use your expertise.

WOODLANDS INSTITUTE

(304) 567-2838 October 16, 1981 SPRUCE KNOB MOUNTAIN CHERRY GROVE WV 26804

Ralph Mumme, Forest Supervisor
Monongahela National Forest
PO Box 1548
Elkins, WV 26241

Dear Mr. Mumme,

I would like to extend my support and approval of the position your agency has taken regarding the extension of the Highland Scenic Highway as noted in the draft environmental statement.

Having spent most of my life in West Virginia, I can appreciate the need for improved roads. Also, having been professionally involved in the promotion of tourism for the state, I realize there are certain demands for this type of development. However, in a time of fiscal conservatism, it would be foolish to build such a highway.

In addition, as population pressures reduce our natural and forested areas in the East, the resource of the Cheat Mountain area as a semi-wilderness retreat will steadily become more valuable to our state and nation.

You and your staff are to be commended for taking this wise and reasonable position. Please include this letter in your file of public comment on this proposal.

Thank you,

Michael Meador

Michael Meador

United States Department of Agriculture

Forest Service

NEFES
180 Canfield Street
Morgantown, WV 26505

Reply to 1950-3

Date October 20, 1981

Subject DEIS, Highland Scenic Highway Study

To Supervisor, Monongahela National Forest

I prefer the No-Action alternative. The most persuasive arguments against any of the "Build" alternatives are: inconsistency with national policy on energy consumption, unfavorable cost/benefit ratios, and adverse effects on wildlife habitat.

Among the unstudied "possibilities," extension of the HSH toward Cass (pages VII-3, 5) seems most practical.

Regards,

John Gill

JOHN D. GILL
Supervisory Research Wildlife Biologist

WEST VIRGINIA DEPARTMENT OF HIGHWAYS

JOHN D. ROCKEFELLER IV
GOVERNOR

1900 Washington Street, East
Charleston, West Virginia
25305

CHARLES L. MILLER
COMMISSIONER

October 22, 1981

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, West Virginia 26241

Dear Mr. Mumme:

The Department of Highways appreciates the opportunity to review the Draft Environmental Impact Statement for extension of the Highland Scenic Highway (WVA 150). We wish to commend you on your report, and add that we have no comments.

Sincerely,

Ava C. Zeitz

Ava C. Zeitz, Director
Environmental Services Division

ACZ:th

EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF ENVIRONMENTAL SCIENCES
CLARK HALL . UNIVERSITY OF VIRGINIA . CHARLOTTESVILLE . VIRGINIA . 22903
(804) 924-7761

October 29, 1981

Mr. Ralph F. Mumme, Forest Supervisor
Monongahela National Forest
P. O. Box 1548
Elkins, West Virginia 26241

Dear Mr. Mumme:

I have read over the Draft EIS Summary report on the Highland Scenic Highway Study and agree with the chosen fifth alternative (not to build it). In times of limited financial resources, and even more importantly, limited available wilderness oriented public land in the east, there is no justification for such a recreational highway. The Blue Ridge Parkway and Skyline Drive serve the needs of those individuals who wish such a driving experience.

Sincerely yours,

Roger A. Pielke

Roger A. Pielke
Associate Professor

RAP:acg

JEANNETTE FITZWILLIAMS
13 West Maple
Alexandria, Virginia

Nov. 8, 1981

Robert M. Williams, Pro. Mgr.
Gannett Fleming,
Corddry and Carpenter, Inc.
P.O.Box 1963
Harrisburg, Pa. 17105

Dear Mr. Williams:

Thanks for sending me the Highland Scenic Highway Study Newsletter.

I am delighted that the recommendation is in favor of "No Build" and hope that is the final outcome.

I want to make one further comment. On page 4 in item 5 near the top of the page you refer to "Construction of a highway for the primary purpose of recreational driving". I have noted in many other documents that "driving for pleasure" is a recreational activity and somehow is assumed to be even more pleasurable if done in a National Forest or Park. I am 67 years old so can well remember when driving for pleasure was a regular Sunday afternoon activity. Cars were new then and this was a recreational activity. That is no longer the case. Then in the 30's and after the war drives like the Skyline Drive were new and popular and again cars were in short supply. There was a good deal of this sort of activity. But now the new highway designs introduced by New York state make ordinary driving an opportunity to view the countryside so that "driving for pleasure" is a rarely used recreational activity. Furthermore there are plenty of back roads outside Parks and Forests that give even greater opportunities for views and pleasure.

Therefore the creation at vast expense of scenic highways is no longer warranted.

Sincerely

Jeannette Fitzwilliams

Jeannette Fitzwilliams,

TO: H. B. Mahoney

F. HENRY SIPE

LICENSED LAND SURVEYOR & FORESTER

1404 HARRISON AVE. - ELKINS, W. VA. 26241

PHONE 304-636-2465

November 18, 1981

Mr. Ralph F. Mumme, Forest Supervisor,
Monongahela National Forest,
P.O.Box 1548,
Elkins, WV 26241

Dear Ralph,

I have reviewed the Draft Environmental Impact Statement for the extension of the Highland Scenic Highway dated October 15, 1981. I am generally familiar with the area involved, having helped Tom Clark cruise timber there before Mower Lumber Company bought the land.

In my opinion the benefits from this project cannot possibly justify its construction. Your recommendation not to build the road is certainly sound.

I cannot conceive of any justification for spending $100,000,000 for constructing the proposed road.

Please add my comments to your file in this project.

Sincerely,

F. Henry Sipe

F.Henry Sipe

MEMBER

WEST VIRGINIA ASSOCIATION OF LAND SURVEYORS
AMERICAN CONGRESS ON SURVEYING AND MAPPING
SOCIETY OF AMERICAN FORESTERS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

6TH AND WALNUT STREETS

PHILADELPHIA, PENNSYLVANIA 19106

NOV 24 1981

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, W. VA 26241

Re: Highland Scenic Highway Study, Pocahontas and Randolph Counties, W. VA
(D-AFS-D40131-WV)

Dear Mr. Mumme:

We have reviewed the draft Environmental Impact Statement for the above proposed project and have classified it as LO-1 in EPA's Reference Category. We have enclosed a copy of the Definition of Codes for the General Nature of EPA Comments to provide a more detailed description of this rating.

We concur and support the decision of the Forest Serivce to select the no build alternative as the preferred alternative. Therefore, we have no objection to further development of the project as described.

If you have any questions, or if we can be of further assistance, feel free to contact us at any time.

Sincerely yours,

John R. Pomponio

John R. Pomponio, Chief
EIS & Wetlands Review Section

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St., S.W.
Washington, D.C. 20590

NOV 25 1981

Mr. Harry B. Mahoney
Highland Scenic Highway Coordinator
Monongahela National Forest
P.O. Box 1548
Elkins, West Virginia 26241

Dear Mr. Mahoney:

This is in response to your request for comments on the draft Environmental Impact Statement for the Highland Scenic Highway in West Virginia between W.V. Route 219 to U.S. Route 250. We have reviewed the draft statement and found it to be a very informative document. The statement provided well developed analyses of impacts and alternatives and the exhaustive process of determining the preferred alternative appears to lead to a well justified decision.

We noted some general discussion of reconsideration of the project with specifications other than those proposed by P.L. 93-87 (i.e. restricted to auto use). The substantial costs to construct the facility, combined with the low traffic volume anticipated, would suggest that there is little need for further study of additional alternatives in the study corridor.

Thank you for the opportunity to review the draft EIS. We look forward to receiving the final statement.

Sincerely,

for Joseph Canny

Martin Convisser, Director
Office of Environment

Mid-Ohio Valley Wild Turkey Federation

CHAPTER OF NATIONAL WILD TURKEY FEDERATION

Box 170
Mineral Wells, WV 26150

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P. O. Box 1548
Elkins, WV 26241

Re: DEIS Highland Scenic Highway

Mr. Mumme:

After reviewing the DEIS on the construction of the Highland Scenic Highway beyond the terminus with U.S. 219, we strongly support and agree with the No-Build Alternative. This alternative is most consistent with our particular concerns for the wild turkey and its habitat. It is also most consistent with our national policy.

At this time I would also like to reiterate our membership's opposition to the 4 construction alternatives. We certainly appreciate the opportunity to review and comment on the DEIS. If myself or our chapter members can be of any future assistance, please contact us. Thank you.

Sincerely,

Bill Hoover

Charles W. Hoover
President

CWH/eys

WEST VIRGINIA SNOWSHOE
HARE ASSOCIATION, Inc.
RT. 1 — BOX 59
MONTROSE, WEST VIRGINIA 26283

December 3, 1981

Re: HIGHLAND SENIC HIGHWAY
POSITION STATEMENT

The West Virginia Snowshoe Hare Association endoraea the "No Build" option concerning the Highland Senic Highway.

Some of the considerations for choosing the "No Build" option are:

1. Total amount of projected expenditures $55 to $62 million dollars,
2. Hidden expenditures in excess of the $55 to $62 million dollars,
3. Limited use highway,
4. Present economic situation of the contributing governmental agencies,
5. Limiting factor of land purchases involved restricted to a narrow corridor area parallel to the highway,
6. Unlimited access potential to now secluded spruce forest type vegetation,
7. Creation of forest openings over 115' in width which would inhibit movement of snowshoe hare (lepus Americanus West Virginia pedor) in what is now an area with few such openings,
8. And lastly, although not a possible alternative under Public Law 93-87, Sec 161, consideration of feasibility of up-dating existing Route 219 within the Tygarts Valley floor appeara to be a most viable option utilizing un-restricting use.

R. E. Beahm
R. E. Beahm
President, WVSHA

glr

Rt. 1
Kerns, W.Va 26276
Dec. 9, 1981

Monongahela National Forest
P.O. Box 1548
Elkins, W.Va. 26241

Dear Mr Mumme,

As a landowner, sportsman, and D.N.R. Wildlife Manager I would like to comment on the Highland Scenic Highway Draft Environmental Impact Statement. I agree with the Forest Service's fifth alternative no-build. I feel the considerations listed, mainly environmental and economical, are good reasons for no build. Also the many areas of controversy would be good reasons for no-action. I think it would really change land uses and put many restrictions on landowners. The fish and wildlife habitat would be greatly affected. So I am in complete agreement with the Forest Service on the fifth alternative. Thanks for reading my comments.

Sincerly yours,

John W. Shiley

TROUT UNLIMITED

916 Echo Road
South Charleston, WV 25303

December 29, 1981

Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P. O. Box 1548
Elkins, WV 26241

Dear Mr. Mumme:

I am writing you on behalf of the West Virginia Council of Trout Unlimited with our comments on the Draft EIS Highland Scenic Highway Study dated September 1981.

I would first commend the thoroughness of the EIS. We appreciate the opportunity to have input on Water Qualify and fishery matters early in the EIS Study and furthermore to have had this data used in the study.

We doubt as noted in a number of references in the EIS that the build alternative(s) will have much effect in the overall control of man-made disturbances. We would expect impacts of timber and mining on the watersheds, therefore, to remain at about the same level "build" or "no build."

On page V-81 under Fishery Related aspects of Recreational Usage we disagree with the statement implying the possible long term improvement of the fishery. Because the remaining native fisheries are so fragile we would expect to lose some of them as a result of the construction. We do not believe mitigating measures can be made adequate!

We do applaud the conclusion drawn from the EIS!

Sincerely,

Max Robertson
Highlands Scenic Highway Contact
West Virginia Council of Trout
Unlimited

1959-1981 "Over twenty years of trout and salmon conservation"
Washington, D C Headquarters • 118 Park Street, S E • Vienna, Virginia 22180 • (703) 281-1100

DEPARTMENT OF THE ARMY
PITTSBURGH DISTRICT, CORPS OF ENGINEERS
WILLIAM S. MOORHEAD FEDERAL BUILDING
1000 LIBERTY AVENUE, PITTSBURGH, PA 15222

ORPED-PE

31 December 1981

SUBJECT: Highland Scenic Highway Study Draft EIS

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, WV 26241

Dear Mr. Mumme:

This is in response to your 15 October 1981 transmittal letter inviting our review and comment on the subject draft EIS. After reviewing the EIS, we agree with the U.S. Forest Service and Federal Highway Administration on their recommendation of the "no-build" alternative as stated on page S-3. It would appear that the local, regional and national interest would be best served by the selection of this alternative.

Sincerely,

John L. Richards

JOHN L. RICHARDS
LTC, Corps of Engineers
District Engineer

DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2127
HUNTINGTON, WEST VIRGINIA 25721

REPLY TO
ATTENTION OF

ORHPD-R

5 JAN 1982

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, WV 26241

Dear Mr. Mumme:

Reference is made to your letter dated 15 October 1981, transmitting the Draft Environmental Impact Statement for Extension of the Highland Scenic Highway to this office for review.

Members of my staff have reviewed the DEIS as to accuracy and sufficiency with respect to the specific interest and jurisdictions of the Corps of Engineers and have no comment with regard to the proposed action.

Thank you for the opportunity to review the document.

Sincerely,

James H. Higman

JAMES H. HIGMAN
Colonel, Corps of Engineers
District Engineer

National Audubon Society

MID-ATLANTIC REGION
WEST VIRGINIA OFFICE
RT 5, BOX 228-A, MORGANTOWN, W. VA. 26505 (304) 296-0565

January 5, 1982

Mr. Ralph F. Mumme
Forest Supervisor
Monongahela National Forest
P.O. Box 1548
Elkins, WV 26241

Dear Mr. Mumme:

We have reviewed the Summary of the Draft Environmental Impact Statement relative to the proposed extension of the Highland Scenic Highway (W.Va. Rt. 150) from U.S. Route 219 to U.S. Route 250. This highway has been a matter of great concern to our membership for many years now and we are very pleased that a final decision on this proposed extension is near.

The Forest Service is to be commended for choosing the "No-Build" alternative which certainly seems to be appropriate given the facts presented. The Highland Scenic Highway as currently completed south of U.S. 219 has cost the public many, many millions of dollars and produced few identifiable benefits. On the contrary the Highlands Scenic Highway has already adversely impacted significant wildlife habitat by opening up a vast roadless area to vehicular traffic. To continue this process further would be poor management of the natural resources involved.

As others who have opposed construction of this highway from the very beginning, we agree that if there is need for better highway transportation in the area, the obvious solution would be the upgrading of U.S. 219 north toward Elkins. The DEIS states that this option was specifically not studied. We believe this option bears examination and may be justified if a build option is chosen. Until completion of such an examination however, the "no-build" alternative is justified.

We appreciate the thoroughness with which the Forest Service has conducted its review of this proposal and we trust our views will be given consideration before a final decision is reached.

Sincerely,

L C Elkinton

Linda Cooper Elkinton
Assistant Regional Representative

AMERICANS COMMITTED TO CONSERVATION

SAYRE RODMAN
32 CRYSTAL DRIVE
OAKMONT, PENNSYLVANIA 15139

January 13 1982

Monongahela National Forest

Box 1584
Elkins, W Va 26241

Att: Mr Mumme

Comment on Scenic Highway DEIS

Gentlemen

This letter is a comment on the Highlands Scenic Highway Study DEIS. issued October 15 1981. The letter agrees with the No-Build Alternative.

I am writing as the chairman of the Scenic Areas Committee of the West Virginia Highlands Conservancy. The longstanding interest of the members of the WVHC in matters of this sort is well known to you. My Committee is the one most directly concerned with sort of mountain country through which the proposed extension of the present Scenic Highway would pass.

The concept of building a new winding scenic road down a remote mountain ridge seems ridiculous in the 1980's, however sensible it may have seemed to many people ten years ago. The primary purpose of the proposed road is to encourage people to take trips down it, driving more than they would otherwise do. It seems impossible for any agency of the Federal Government, whose financial outlook is well known, to seriously propose spending over $50 million to encourage people to burn more gas.

The DEIS correctly refuses to consider normal upgrading of the parallel Route 219 and building a scenic road, in the same document. Upgrading many West Virginia roads, for all users including truckdrivers. could be a rational use of public funds. But the prime purpose of the scenic highway is not efficient transportation.

Even the well-written DEIS does confuse the subjects at times. I have good credentials as a lover of West Virginia scenery, and as a downhill skier. I don't confuse the subjects. If I were hurrying to ski at Snowshoe on a winding road built for 40 MPH sightseeing, I would not be enjoying the view. I would be cursing the idiots who built this road up here in the foul weather. If public money is to be used to get skiers to Snowshoe, do it some other way, please.

The DEIS mentions bad weather as a serious drawback on the proposed routes. It certainly is. Some of the ridges lying East of the proposed route are extremely scenic themselves, with superb views. We oppose spending money for any scenic road of this sort. but those ridges would in fact make a little more sense, because of weather, for family fun driving.

The DEIS shows a benefit/cost ratio of around 0.6, which is unattractive even aside from the issue of wasting gas. In fact the ratio could be seen as much worse. Many costs and benefits shown are the same item, counted on both sides. A million dollars spent on local labor injects n million dollars into the local economy, for example. If we eliminate simple money transfer payments, and look only at items like using a million dollars for paving materials, to benefit the people who will drive on it, the ratio would be much worse.

The DEIS covers n wide range of issues of great interest to the WVHC. and does it well enough that we can only complement the writers, without going into further detail. But we wish to discuss one main issue not really covered.

The DEIS shows in detail how taking of land for the highway, and acquiring extensive scenic easements, would curtail the land and water degrading operations of lumbering and strip mining on private land. primarily on the land of Mower Lumber. The DEIS balances loss of income to the operators against improvements in scenery and water quality, and presumably estimates the effect well. In some ways, this is the most clearcut visible benefit of building the highway, from many conservation viewpoints.

But can the spending of over $50 million in public funds, to build an unnecessary road, be justified as the only means at hand of disciplining sloppy operations? The WVHC has spent a large portion of its time and resources hoping to protect land and water quality along Shavers Fork. We would welcome better water flowing under the bridge at Route 250, at the downstream end of the proposed scenic road. But we hope that there is a more rational way to achieve this goal.

Very truly yours

Sayre Rodman

Sayre Rodman
Chairman, Scenic Areas Committee
West Virginia Highlands Conservancy

512 Kanawha Blvd. W.
Charleston, WV 25302
January 15, 1982

Mr. Ralph Mumme
Supervisor
Monongahela National Forest
Box 1534
Elkins, WV 26241

Dear Mr. Mumme,

This letter is offered in comment on the Highland Scenic Highway Draft Environmental Impact Statement.

I am very glad that the Forest Service has recommendod that this expensive and unnecessary project not be carried out. It is clear from having read the draft that the scopo of the studies was comprehensive and that they were carried out in a conscientioue manner. The exposition is lucid and does a very good job of presenting all the relevant issues to persons like myeelf, a former resident of Pocahontas county, who oare a great deal about the natural and social character of the state's highland region but do not command the expertise aesembled in the document.

An undertaking of this quality was no doubt costly in itself. But if it should prevent the waete of $60 million to build an unneeded highway it must be ratod a great bargain for the public. The document itself, ae a survey of interlinked environmental, economic and transportation issues affecting the region, may be the principal benefit genorated by the propeeed scenic highway extension.

Sincerely youre,

Bardwell E. Montgomery

Bardwell E. Montgomory

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SECTION IX

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APPENDIX

SECTION X

APPENDIX A

HIGHLAND SCENIC HIGHWAY

SEC. 161. (a) The Secretary of Agriculture (acting through the Forest Service) is authorized to develop and construct as a parkway the Highland Scenic Highway from West Virginia State Route 39 to U.S. 250 near Barton Knob. Notwithstanding subsection (c) of section 103 of title 23, United States Code, such parkway shall be a route on the Federal-aid secondary system. Ante, p.274.

(b) The route from Richwood, West Virginia, to U.S. 250 near Barton Knob, via West Virginia State Route 39 and the parkway authorized by subsection (a) of this section shall be designated as the Highland Scenic Highway.

(c) The Secretary of Agriculture is authorized to acquire rights-of-way, land containing such rights-of-way, and interests in land, including scenic easements and mineral rights, necessary to carry out the purpose of a scenic highway. In addition to the acquisition of such lands and interests in lands, funds available for parkways shall be available for the reclamation of lands within the scenic corridor of the Highland Scenic Highway. *Land acquisition.*

(d) Funds available for parkways shall be available for signs on Interstate highways, Appalachian highways and other appropriate highways at natural points of access to such geographic area, indicating the direction and distance to the Highland Scenic Highway and to Richwood as "Gateway to the Highland Scenic Highway". *"Gateway to the Highland Scenic Highway."*

(e) Funds available for parkways shall be available for upgrading that portion of West Virginia State Route 39 designated as the Highland Scenic Highway to appropriate standards for a scenic and recreational highway, including the construction of vistas and other scenic improvements.

(f) The Highland Scenic Highway as authorized by subsection (a) of this section and all associated lands and rights-of-way shall be managed as part of the Monongahela National Forest, solely for scenic and recreational use and passenger car travel.

(g) The Highland Scenic Highway as authorized by subsection (a) of this section shall be designed and constructed in accordance with standards appropriate for a scenic highway, providing for moderate speeds and minimizing modification to topographic contours and natural drainage. *Design and construction standards.*

(h) Construction of the portion of the Highland Scenic Highway as authorized by subsection (a) of this section which is proposed to be constructed through the upper Shavers Fork watershed shall not be initiated until— *Upper Shavers Fork watershed portion, construction conditions.*

(1) the Forest Service has acquired sufficient lands and interests in land (including mineral rights) in such watershed to assure an adequate scenic corridor for the Highland Scenic Highway and the control of water quality in Shavers Fork; and

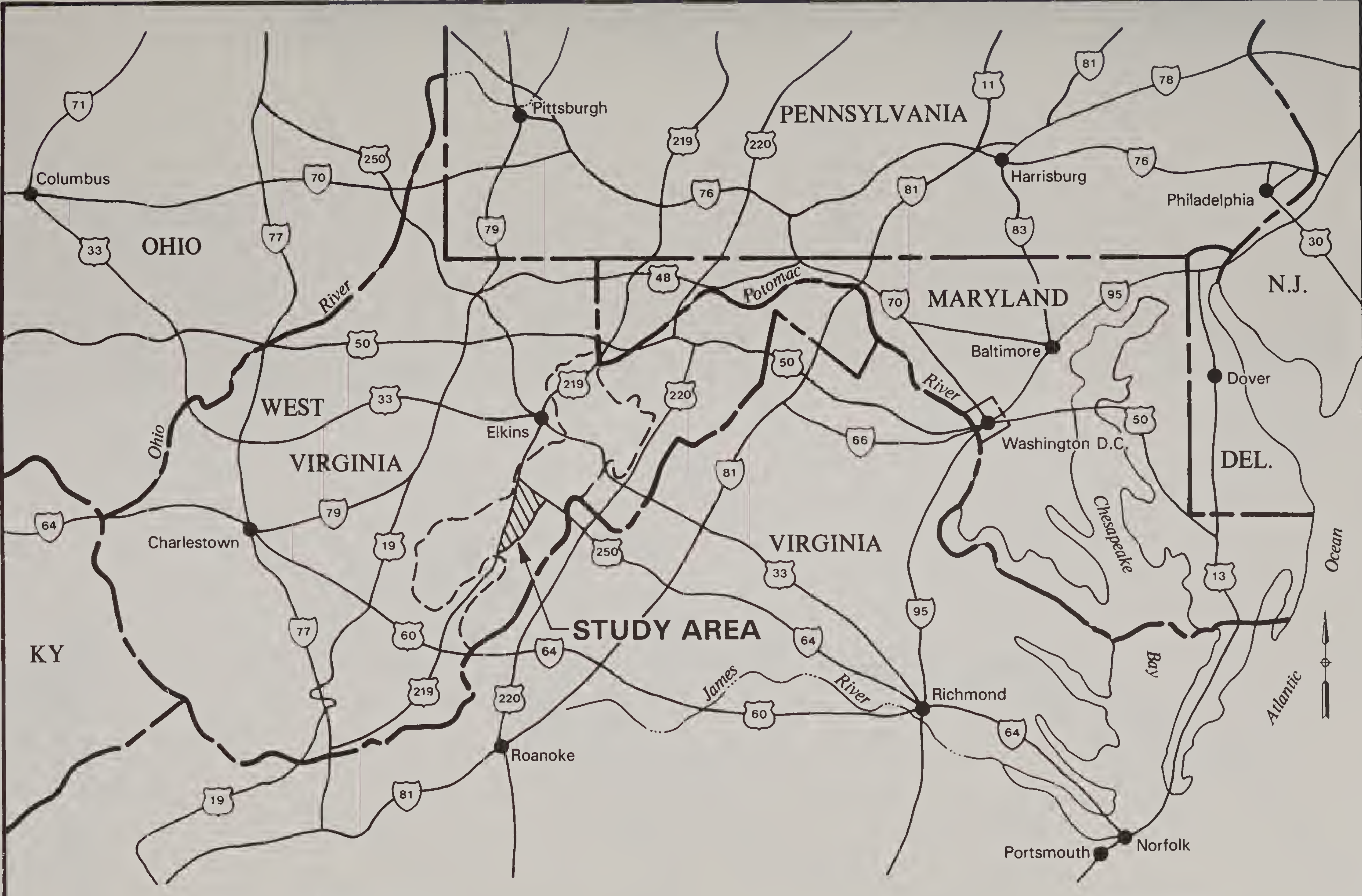
(2) the completion of a geological and soil survey of any proposed route, conducted in cooperation with the Division of Water Resources of the West Virginia Department of Natural Resources.

(i) Any parkway authorized in the future to proceed southward in such area shall begin in the immediate vicinity of Richwood, West Virginia.

(j) Any connection of the Highland Scenic Highway as authorized by subsection (a) of this section with Corridor H of the Appalachian Development Highway System or any more northerly segment of the Highland Scenic Highway shall utilize existing routes and not involve construction through the Monongahela National Forest between U.S. 250 and Cunningham Knob.

APPENDIX B

FIGURES



— — — MONONGAHELA NATIONAL FOREST

FIGURE 1

PROJECT LOCATION

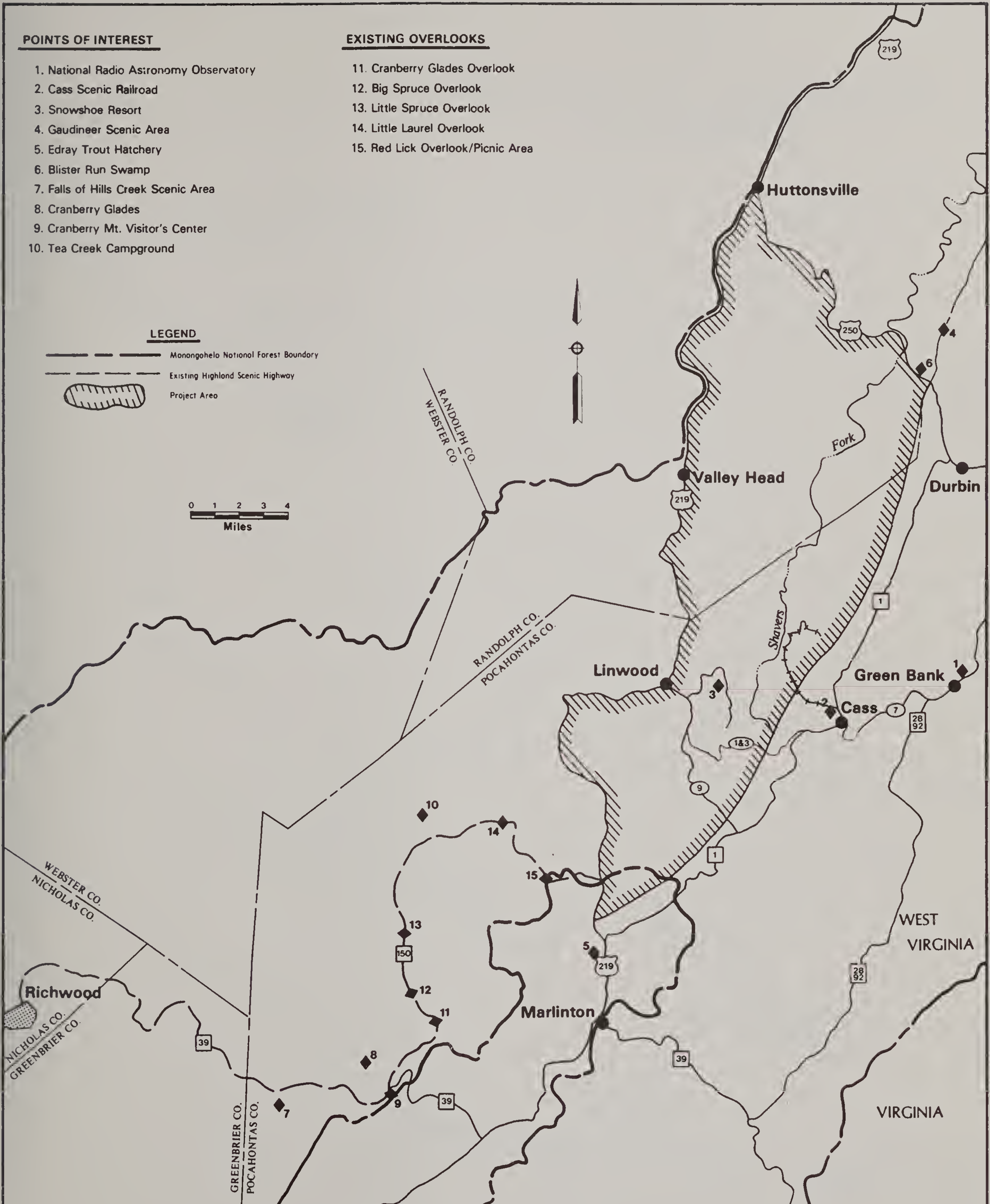


FIGURE 2

HIGHLAND SCENIC HIGHWAY POINTS OF INTEREST AND EXISTING OVERLOOKS

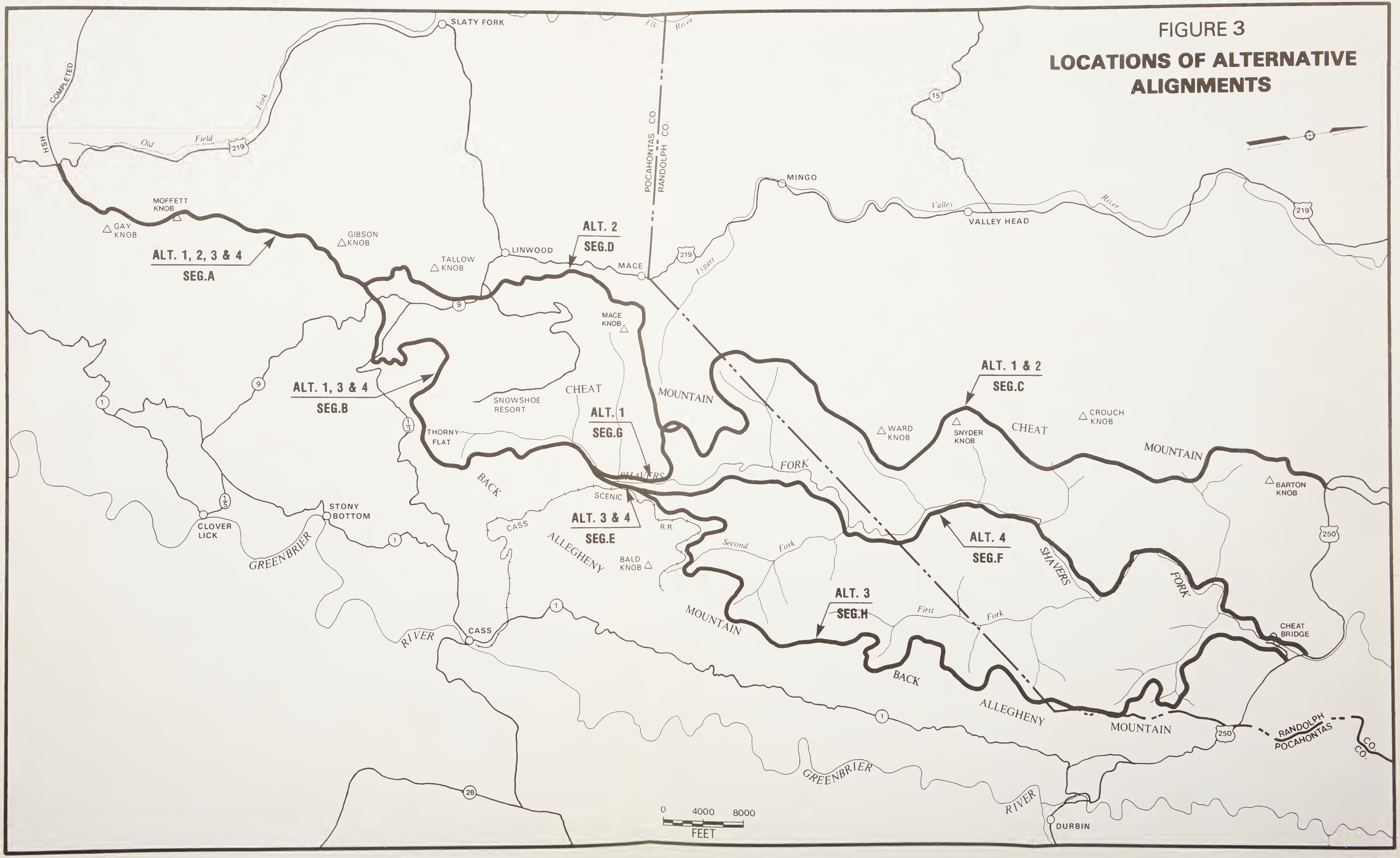
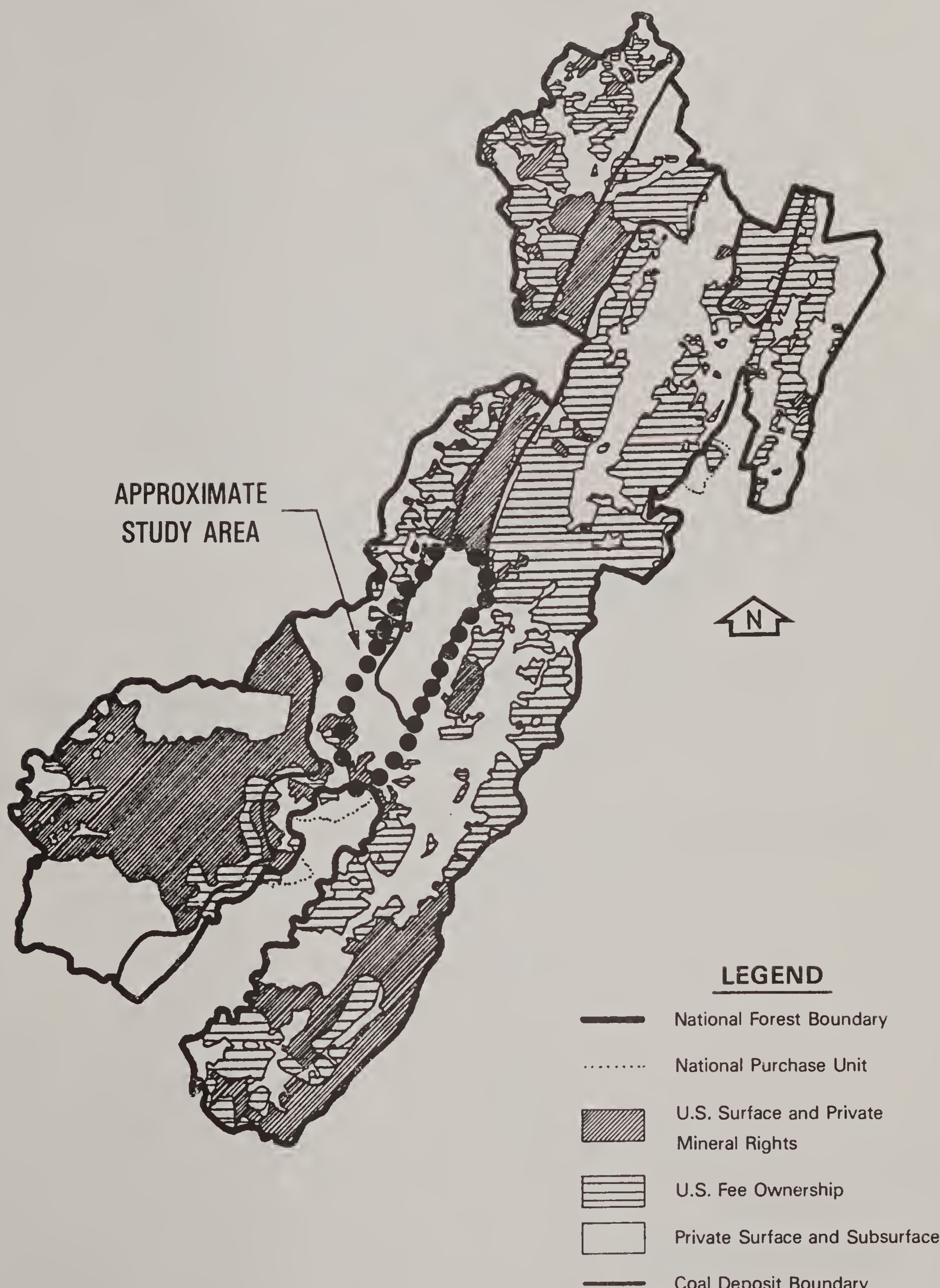


FIGURE 3
LOCATIONS OF ALTERNATIVE ALIGNMENTS
ALT. 1, 2, 3 & 4
SEG.A
ALT. 1, 3 & 4
SEG.B
ALT. 1 & 2
SEG.C
ALT. 2
SEG.D
ALT. 3 & 4
SEG.E
ALT. 4
SEG.F
ALT. 1
SEG.G
ALT. 3
SEG.H
SLATY FORK
COMPLETED
HSH
Old Field Fork
Elk River
POCAHONTAS CO.
RANDOLPH CO.
MINGO
VALLEY HEAD
Valley River
MOFFETT KNOB
GAY KNOB
GIBSON KNOB
TALLOW KNOB
LINWOOD
MACE
MACE KNOB
Tygart
CHEAT MOUNTAIN
SNOWSHOE RESORT
THORNY FLAT
SHAVERS FORK
WARD KNOB
SNYDER KNOB
CROUCH KNOB
BARTON KNOB
SCENIC
CASS
R.R.
BACK ALLEGHENY MOUNTAIN
BALD KNOB
Second Fork
First Fork
CHEAT BRIDGE
CLOVER LICK
STONY BOTTOM
GREENBRIER RIVER
CASS
DURBIN
RANDOLPH CO.
POCAHONTAS CO.
0 4000 8000
FEET

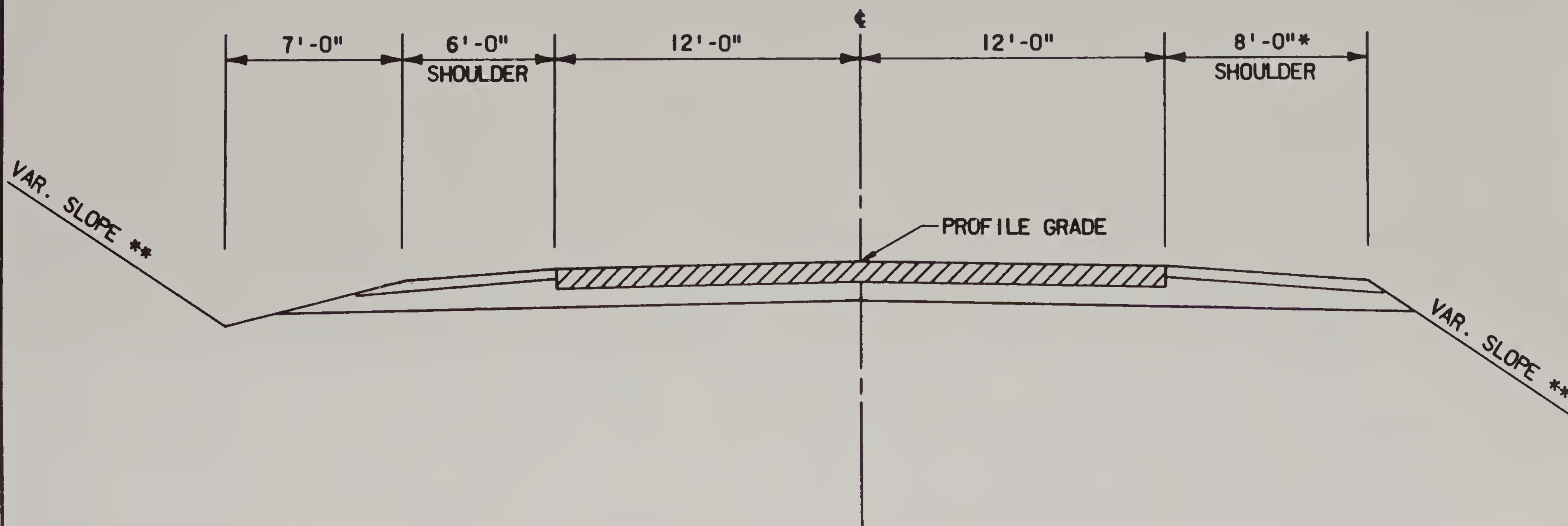
FIGURE 4A

LAND OWNERSHIP MONONGAHELA NATIONAL FOREST



Source: Monongahela National Forest Land Management Plan

FIGURE 4B
ALTERNATIVE LOCATIONS AND PROPERTY OWNERSHIP



NORMAL ROADWAY SECTION

* 10'-0" WITH GUARD RAIL

** FILL SLOPES

UNDER 5' DEPTH - 4:1 SLOPE
5' TO 10' DEPTH - 2:1 SLOPE
OVER 10' DEPTH - 1 1/2:1 SLOPE

CUT SLOPES

UNDER 5' DEPTH - 2:1 SLOPE
5' TO 10' DEPTH - 1 1/2:1 SLOPE
OVER 10' DEPTH - SLOPE WILL BE AS STEEP AS LOCAL SOIL CONDITIONS WILL PERMIT

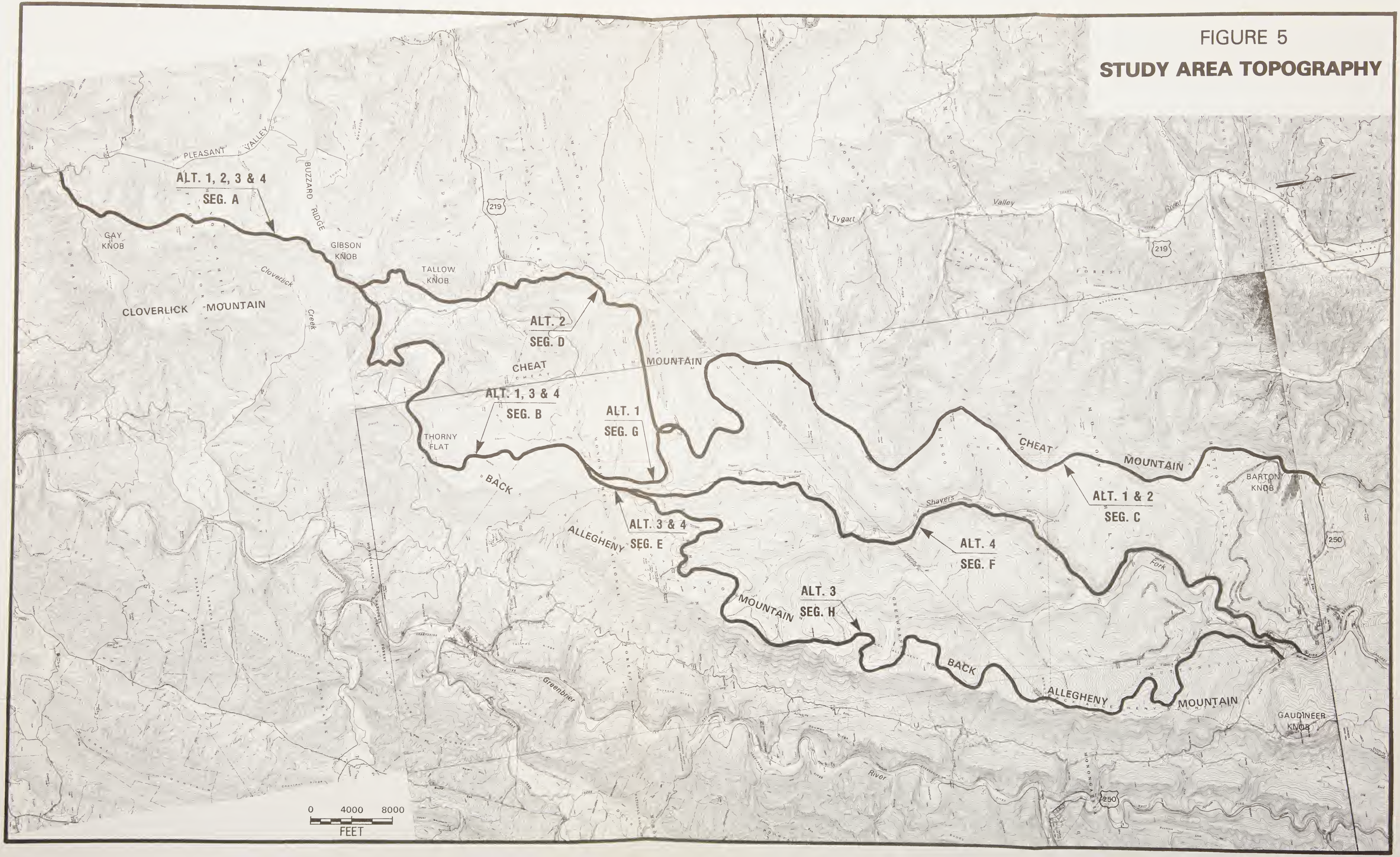
NOTE: BIKEWAY LANE (WIDTH 10') WOULD BE LOCATED ADJACENT TO ROADWAY, IF PROVIDED.

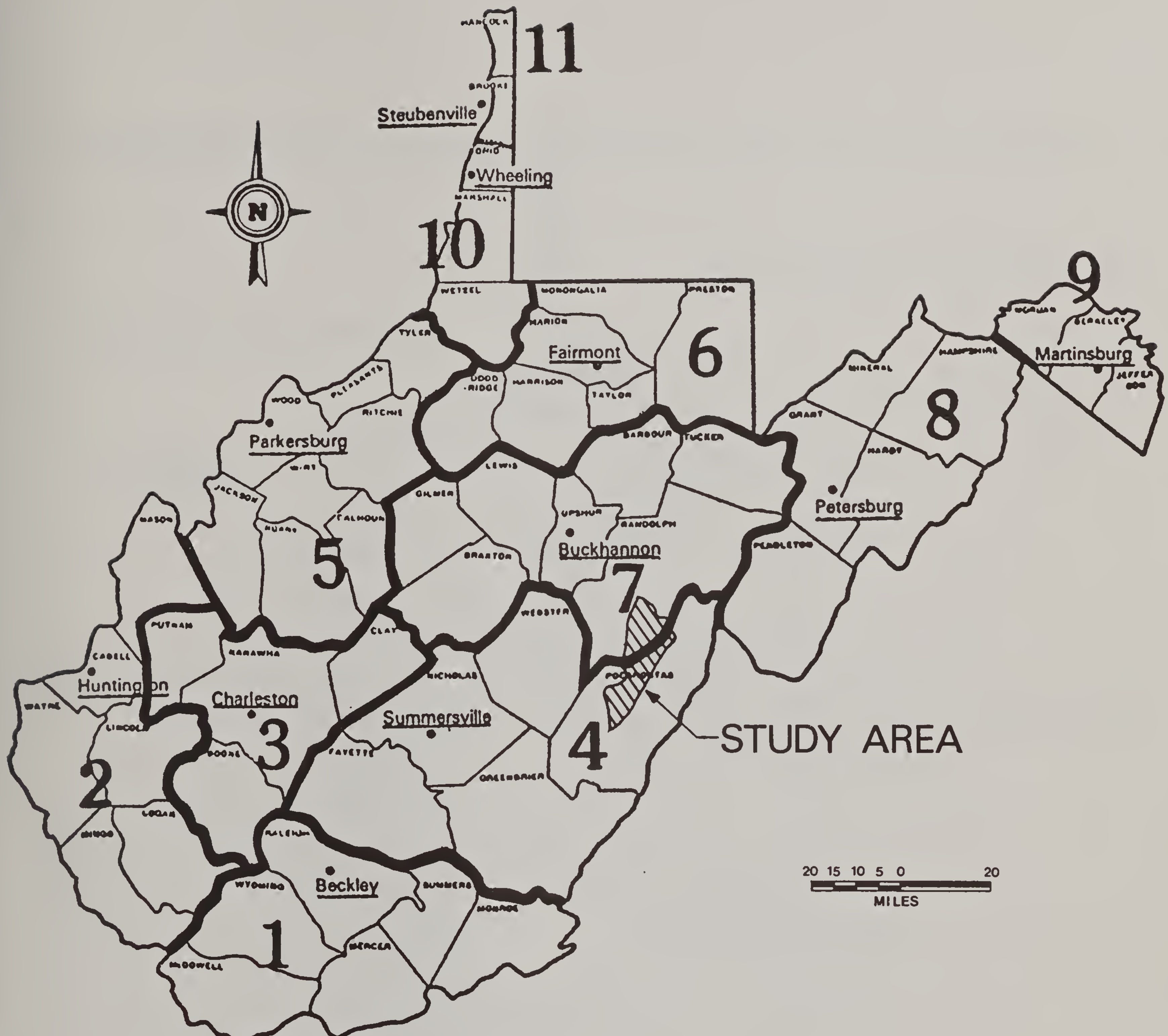
FIGURE 4-C

TYPICAL ROADWAY CROSS-SECTION

FIGURE 5

STUDY AREA TOPOGRAPHY

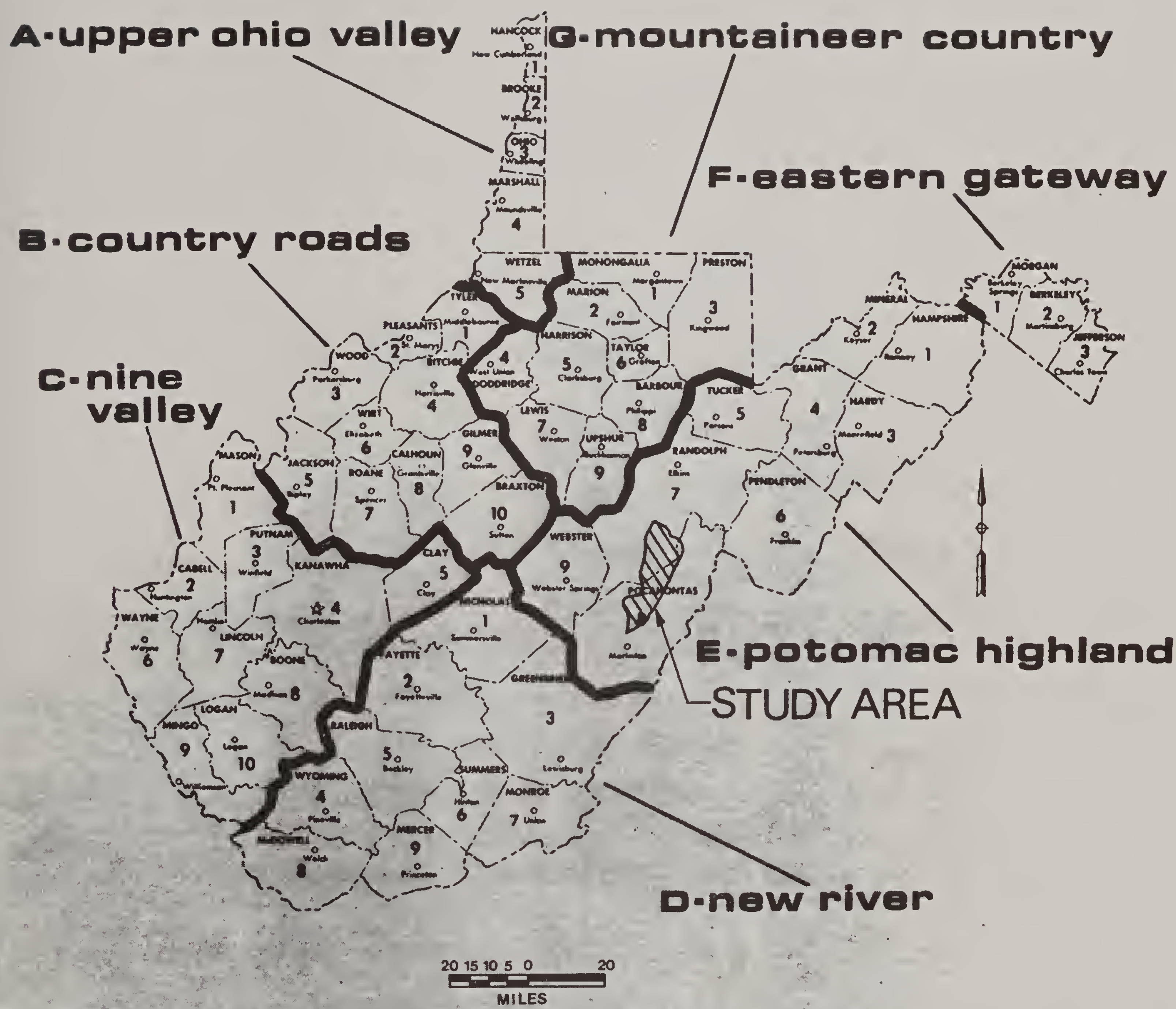




WEST VIRGINIA
Planning And Development Regions

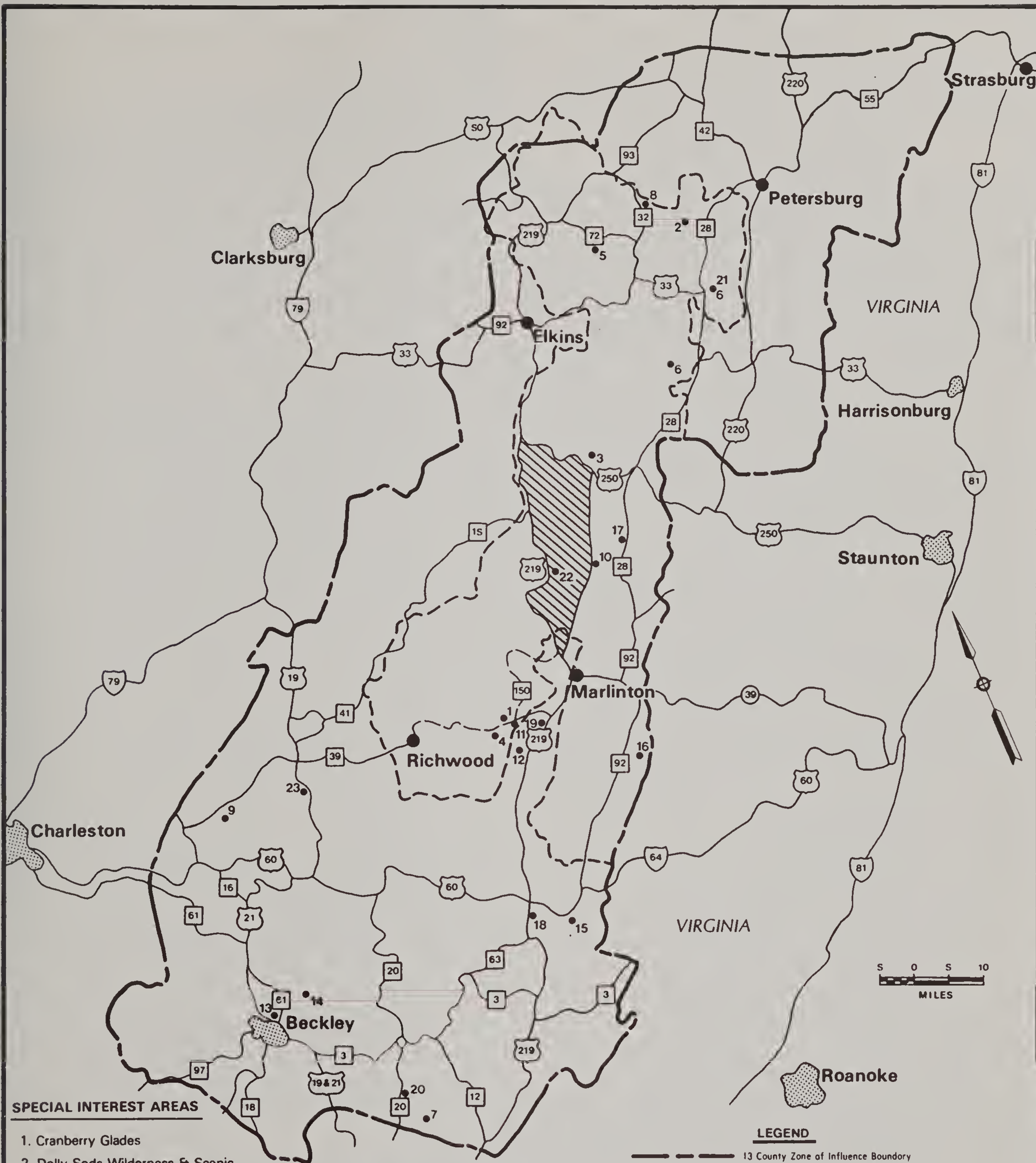
Source: Governor's Office of Economic and Community Development, Economic Development Division

FIGURE 6



West Virginia Travel Regions

FIGURE 7



SPECIAL INTEREST AREAS

1. Cranberry Glades
2. Dolly Sods Wilderness & Scenic Area & Fisher Spring Run Bog
3. Gaudineer Scenic Area
4. Hills Creek Falls
5. Otter Creek Wilderness Area & Shavers Mt. Spruce Patch
6. Spruce Knob - Seneca Rocks

OTHER ATTRACTIONS

7. Bluestone Dam/Lake
8. Canaan Valley
9. Carnifex Ferry
10. Cass Scenic Railroad
11. Cranberry Mt. Visitor's Center
12. Droop Mountain State Park
13. Exhibition Coal Mine
14. Grandview State Park
15. Greenbrier Resort
16. Lake Sherwood
17. National Radio Astronomy Observatory
18. Old Stone Church
19. Pearl Buck's Home
20. Pipestem Resort
21. Seneca Rocks Visitor's Center
22. Snowshoe Resort
23. Summersville Dam/Lake

FIGURE 8

13 COUNTY ZONE OF INFLUENCE - SPECIAL INTEREST AREAS & ATTRACTIONS

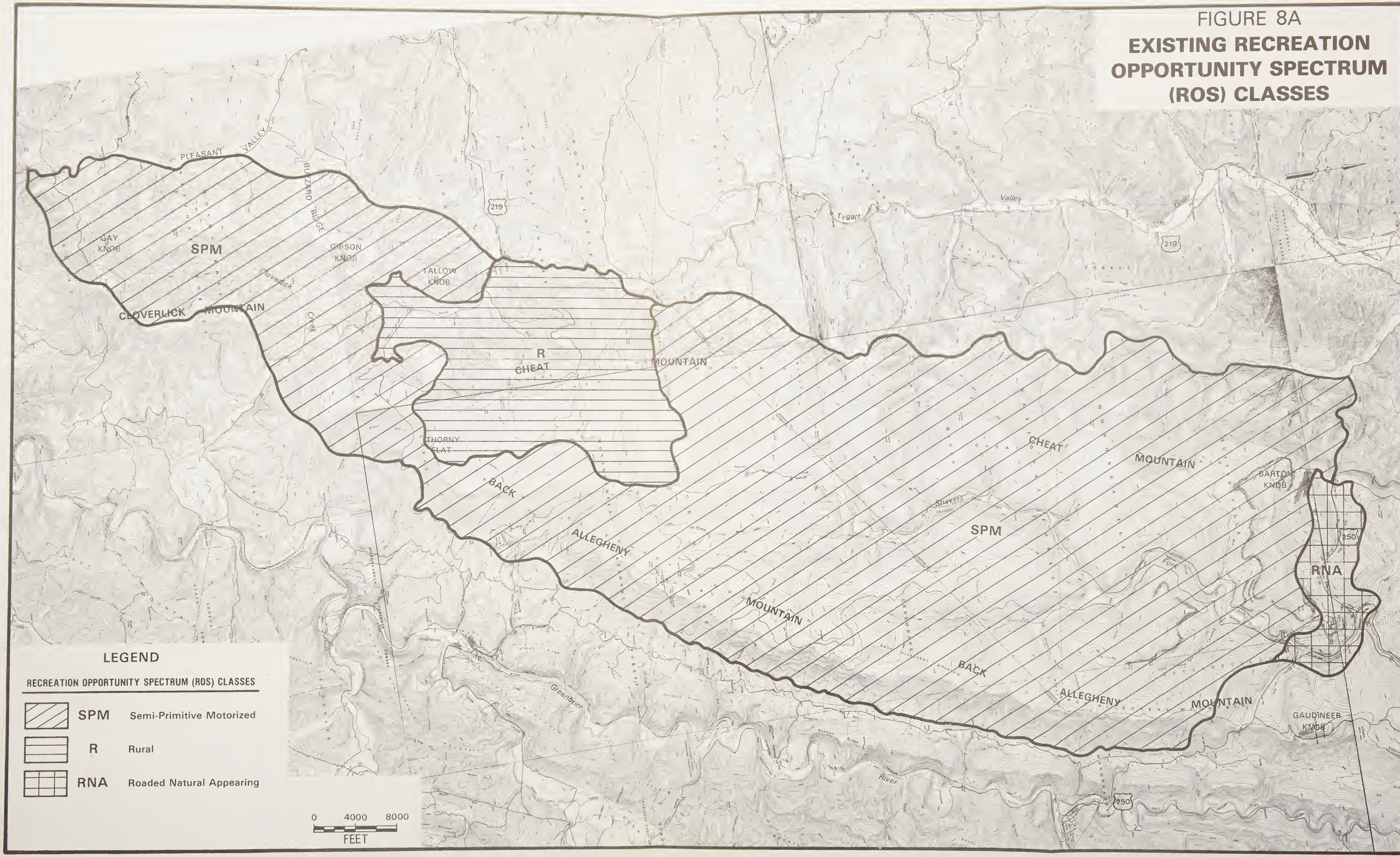


FIGURE 8A
EXISTING RECREATION OPPORTUNITY SPECTRUM (ROS) CLASSES
LEGEND
RECREATION OPPORTUNITY SPECTRUM (ROS) CLASSES
SPM Semi-Primitive Motorized
R Rural
RNA Roaded Natural Appearing
0 4000 8000
FEET
SPM
R
RNA
PLEASANT VALLEY
BUZZARD RIDGE
GAY KNOB
GIBSON KNOB
TALLOW KNOB
CLOVERLICK MOUNTAIN
Cloverlick Creek
CHEAT MOUNTAIN
THORNY FLAT
BACK ALLEGHENY MOUNTAIN
BARTON KNOB
GAUDINEER KNOB
Shavers Fork
Tygart Valley River
Greenbrier River
219
250

FIGURE 9
STUDY AREA GEOLOGY

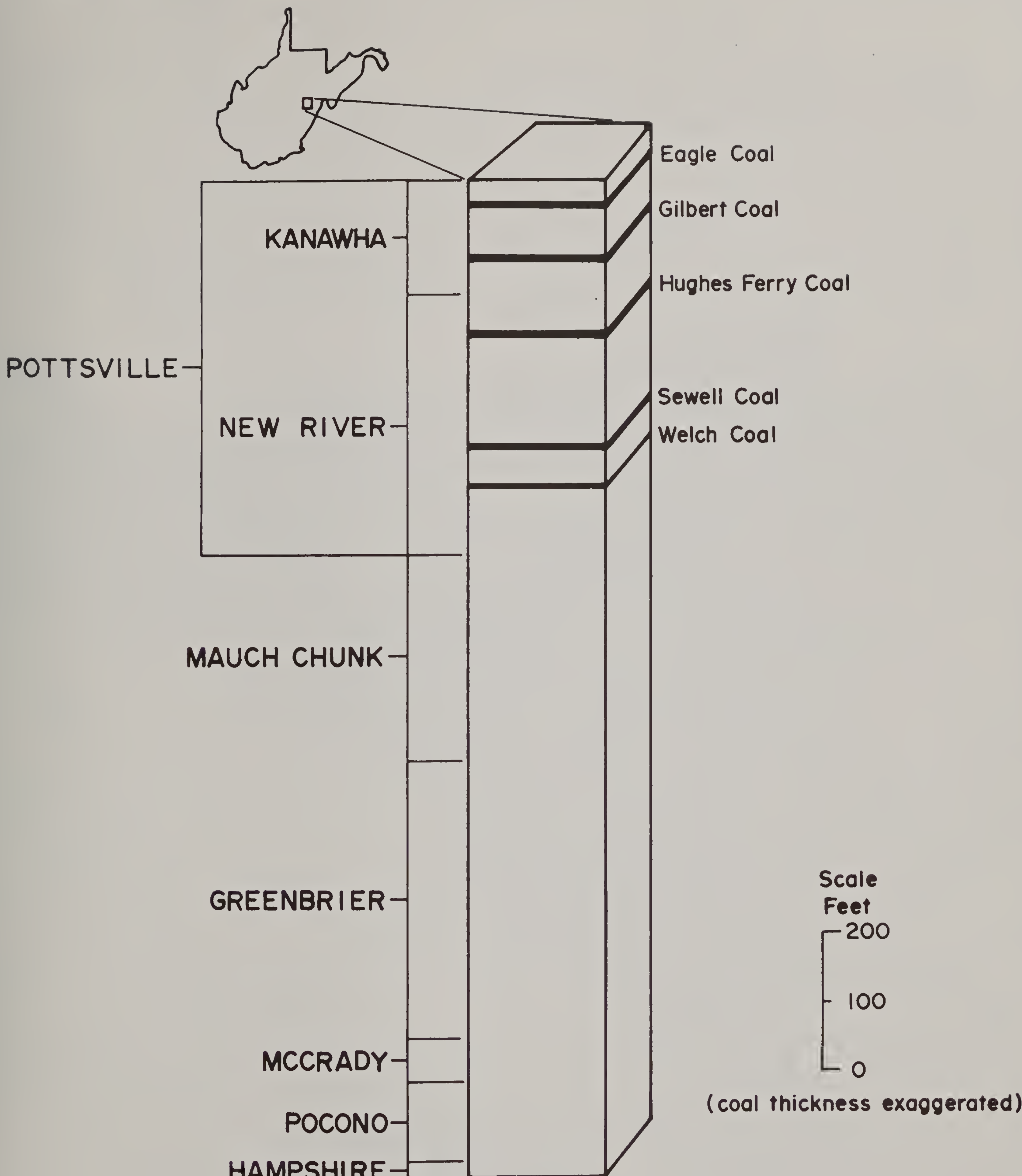


FIGURE 10

STRATIGRAPHIC POSITION OF MINEABLE COAL SEAMS IN SHAVERS FORK

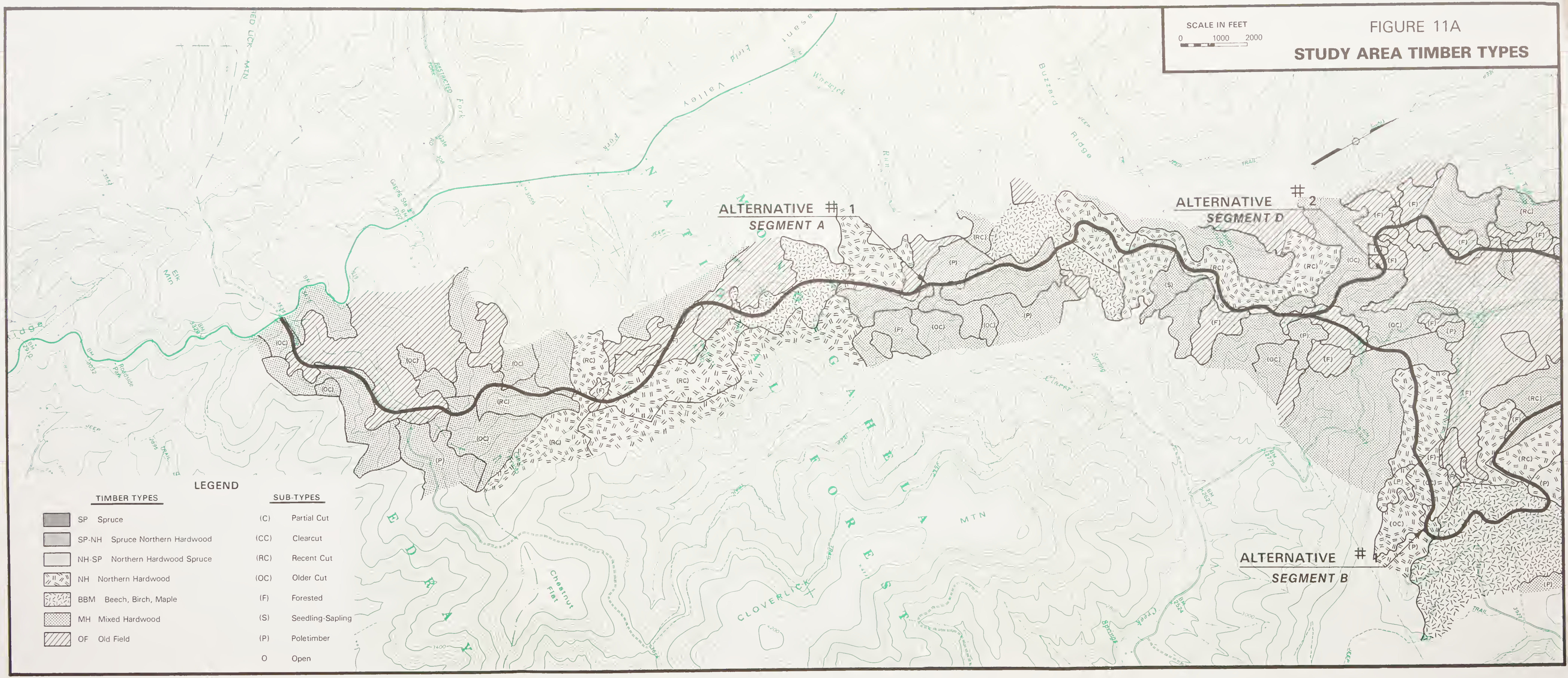


FIGURE 11A
STUDY AREA TIMBER TYPES
SCALE IN FEET
0 1000 2000
ALTERNATIVE # 1
SEGMENT A
ALTERNATIVE # 2
SEGMENT D
ALTERNATIVE # 1
SEGMENT B
LEGEND
TIMBER TYPES
SP Spruce
SP-NH Spruce Northern Hardwood
NH-SP Northern Hardwood Spruce
NH Northern Hardwood
BBM Beech, Birch, Maple
MH Mixed Hardwood
OF Old Field
SUB-TYPES
(C) Partial Cut
(CC) Clearcut
(RC) Recent Cut
(OC) Older Cut
(F) Forested
(S) Seedling-Sapling
(P) Poletimber
O Open

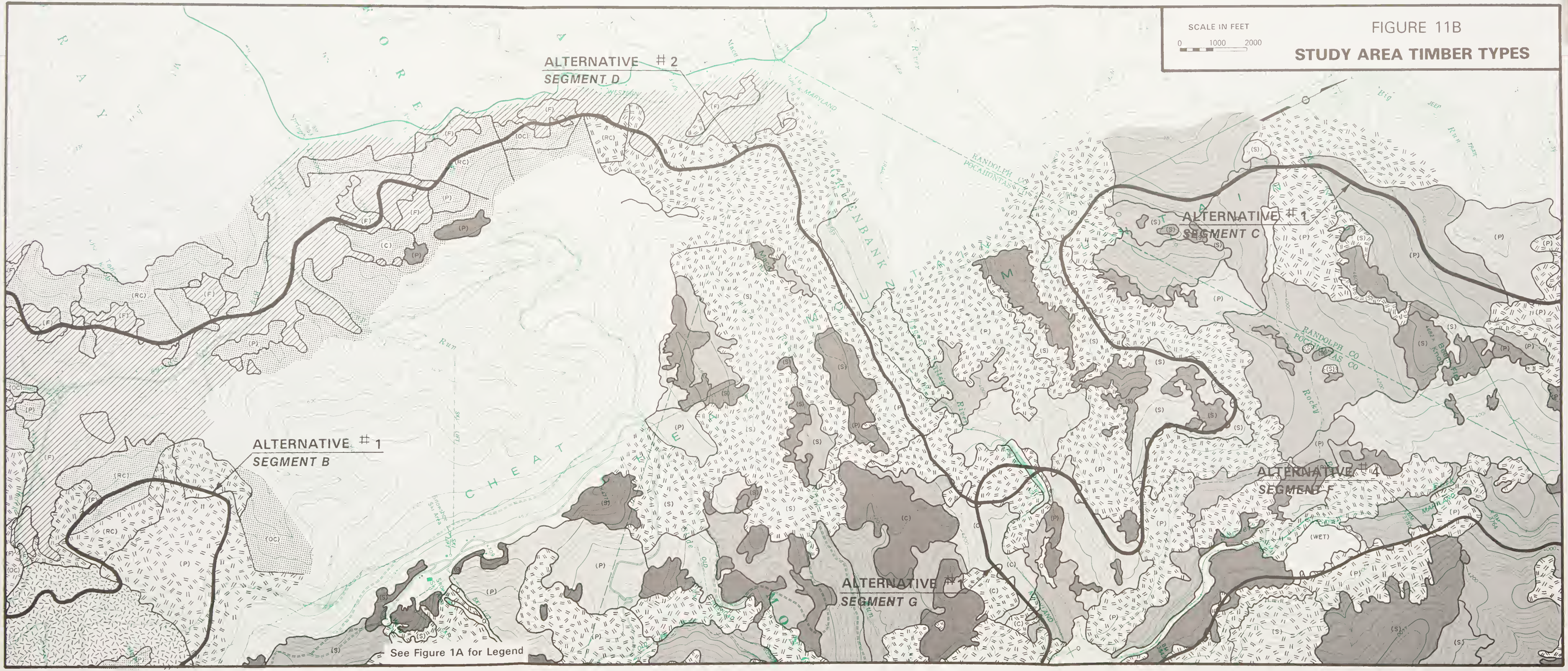


FIGURE 11B

STUDY AREA TIMBER TYPES

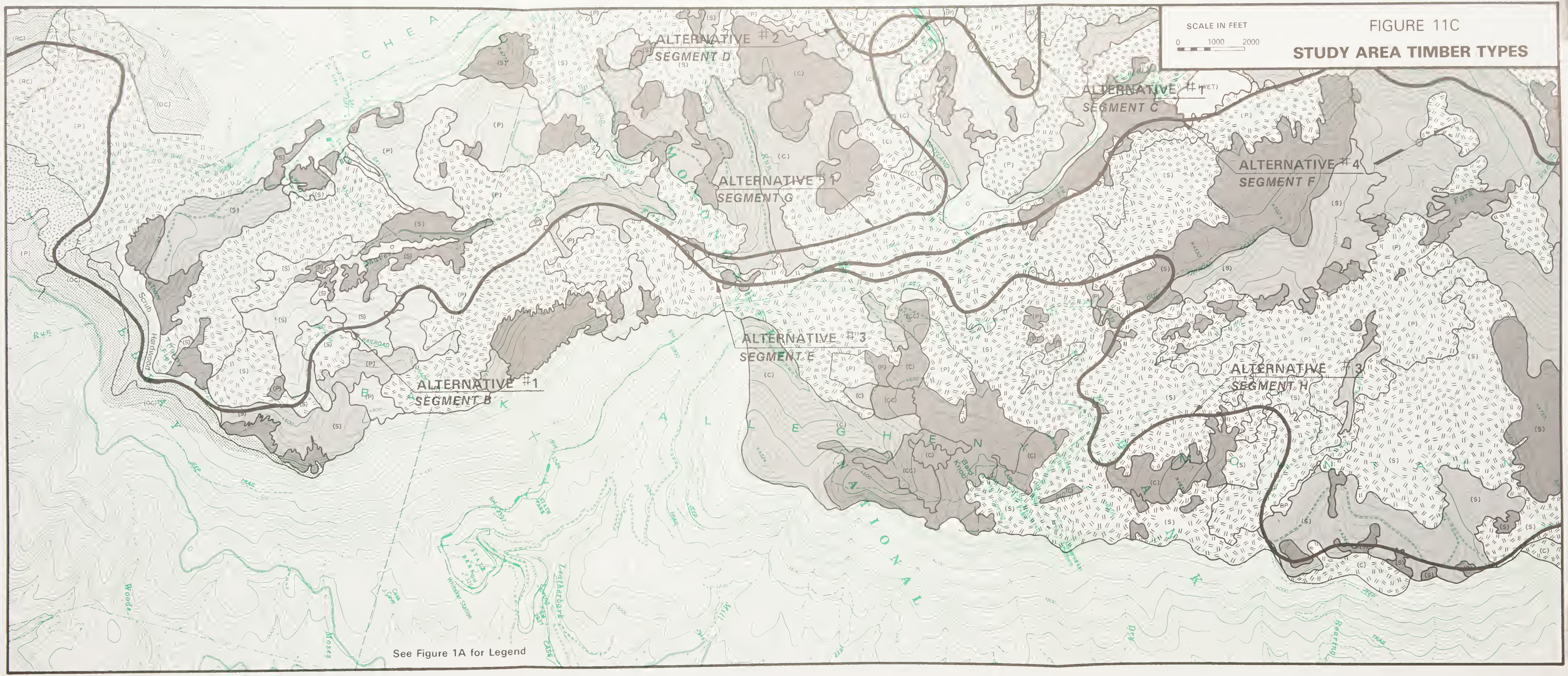
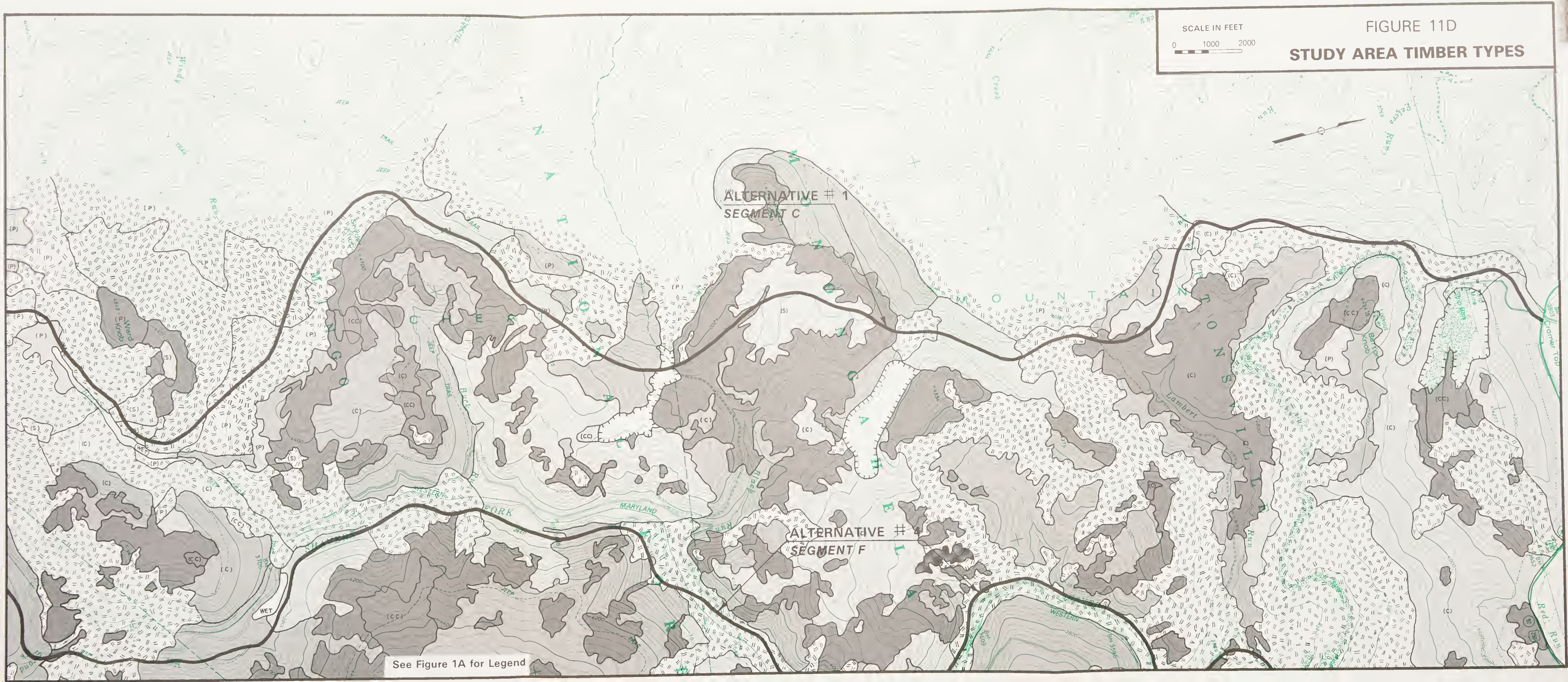


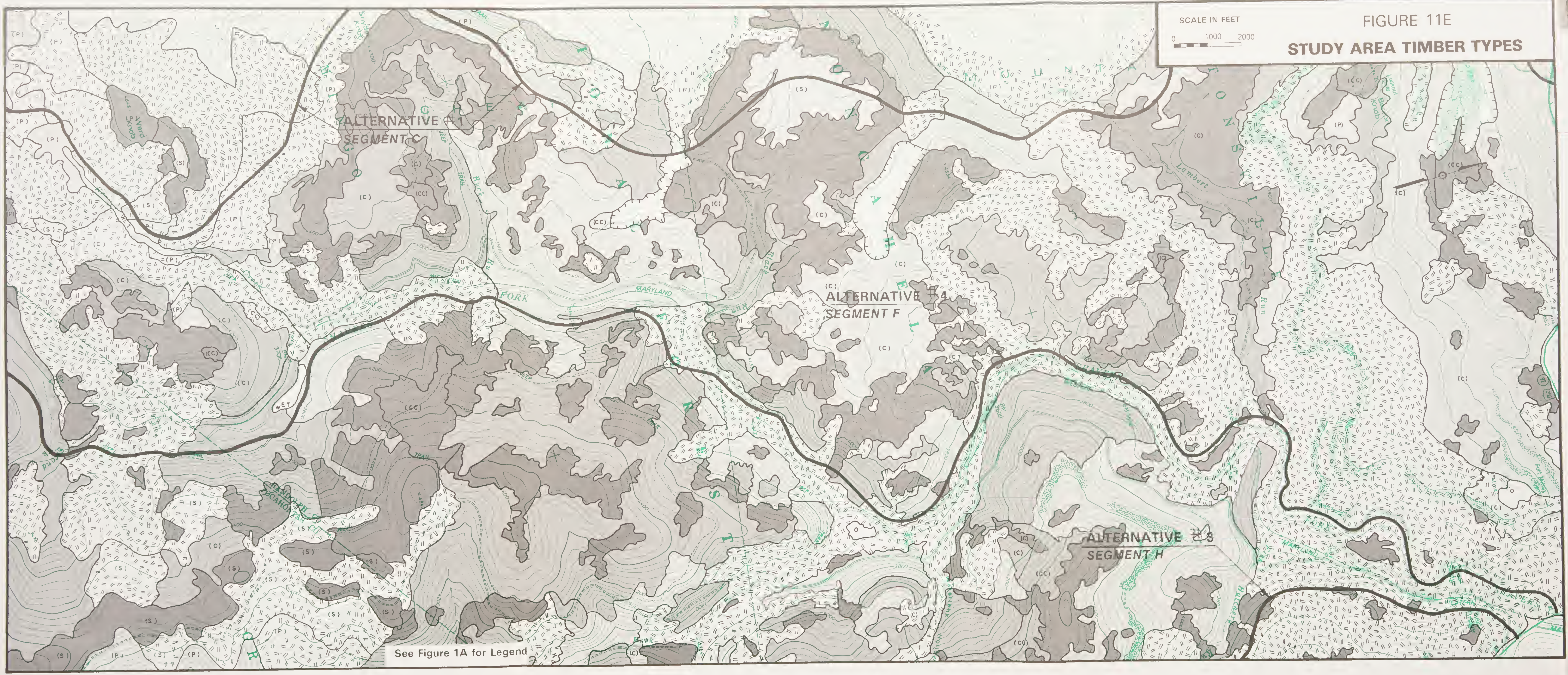
FIGURE 11C

STUDY AREA TIMBER TYPES

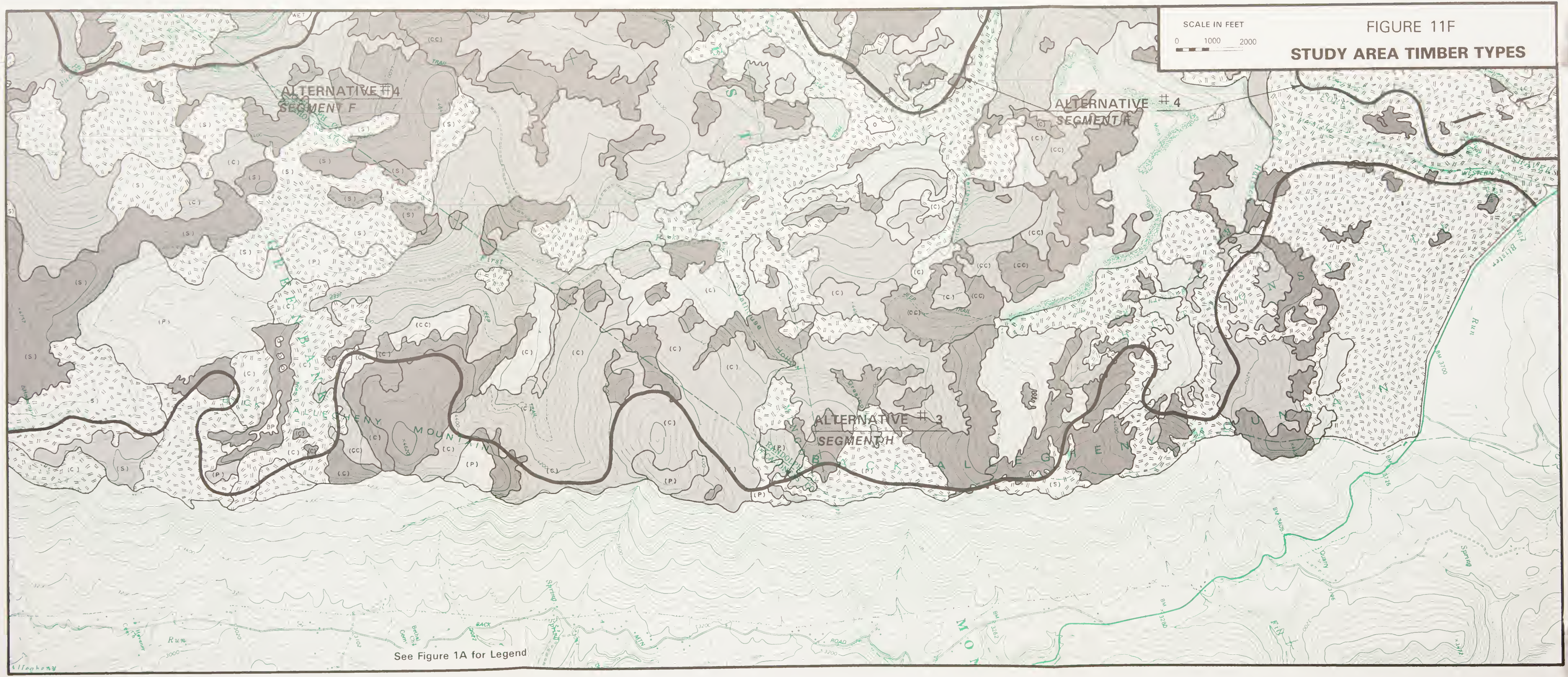
FIGURE 11D

STUDY AREA TIMBER TYPES





SCALE IN FEET
0 1000 2000
FIGURE 11E
STUDY AREA TIMBER TYPES
ALTERNATIVE #1
SEGMENT C
ALTERNATIVE #4
SEGMENT F
ALTERNATIVE #3
SEGMENT H
FORK
MARYLAND
See Figure 1A for Legend


SCALE IN FEET
0 1000 2000
FIGURE 11F
STUDY AREA TIMBER TYPES
ALTERNATIVE #4
SEGMENT F
ALTERNATIVE #4
SEGMENT E
ALTERNATIVE #3
SEGMENT H
ALLEGHENY MOUNTAIN
See Figure 1A for Legend

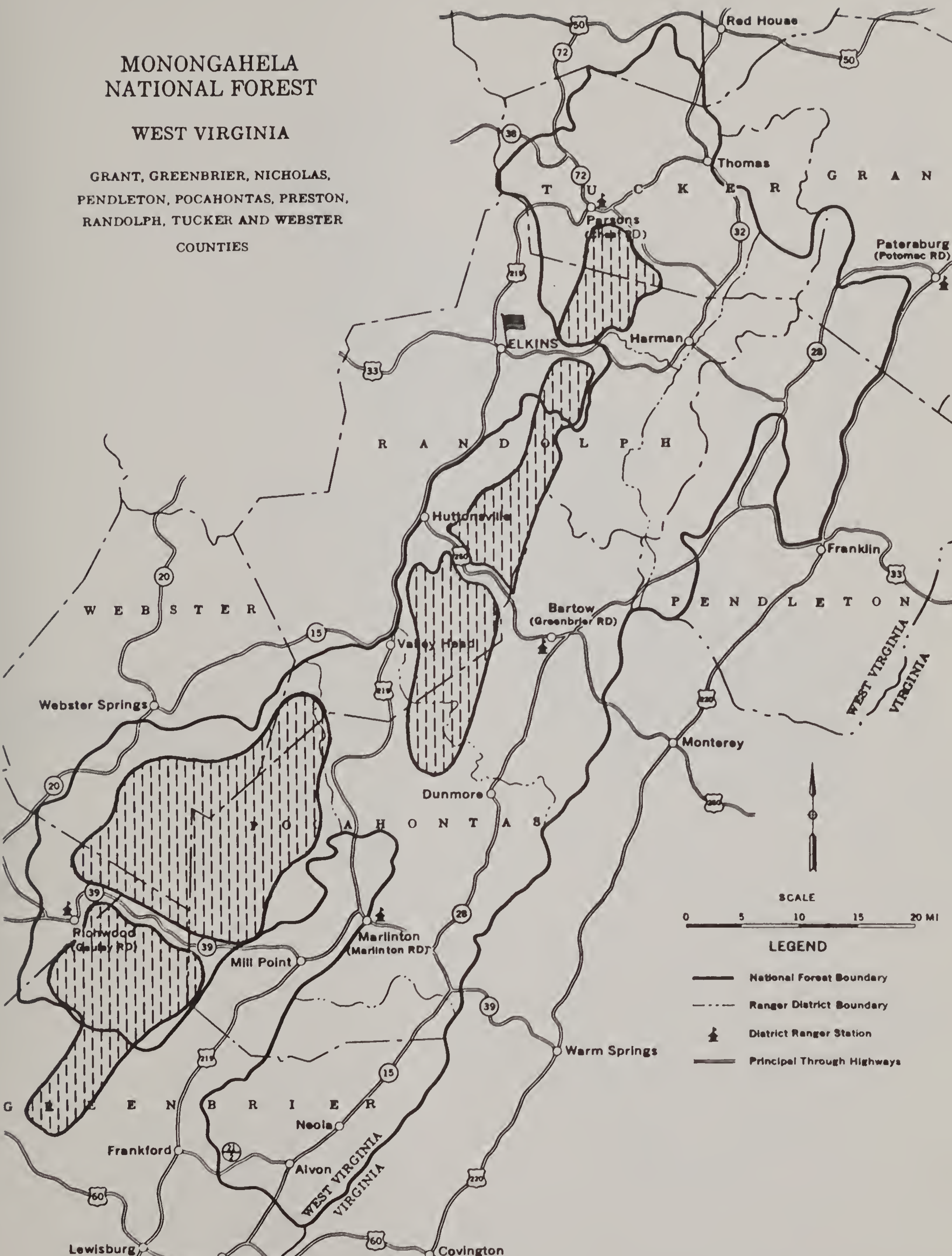


FIGURE 12 Quality Black Bear Habitat Relative to National Forest Boundary.

Source: W. Va. DNR Today's Plan for Tomorrows Wildlife, 1977

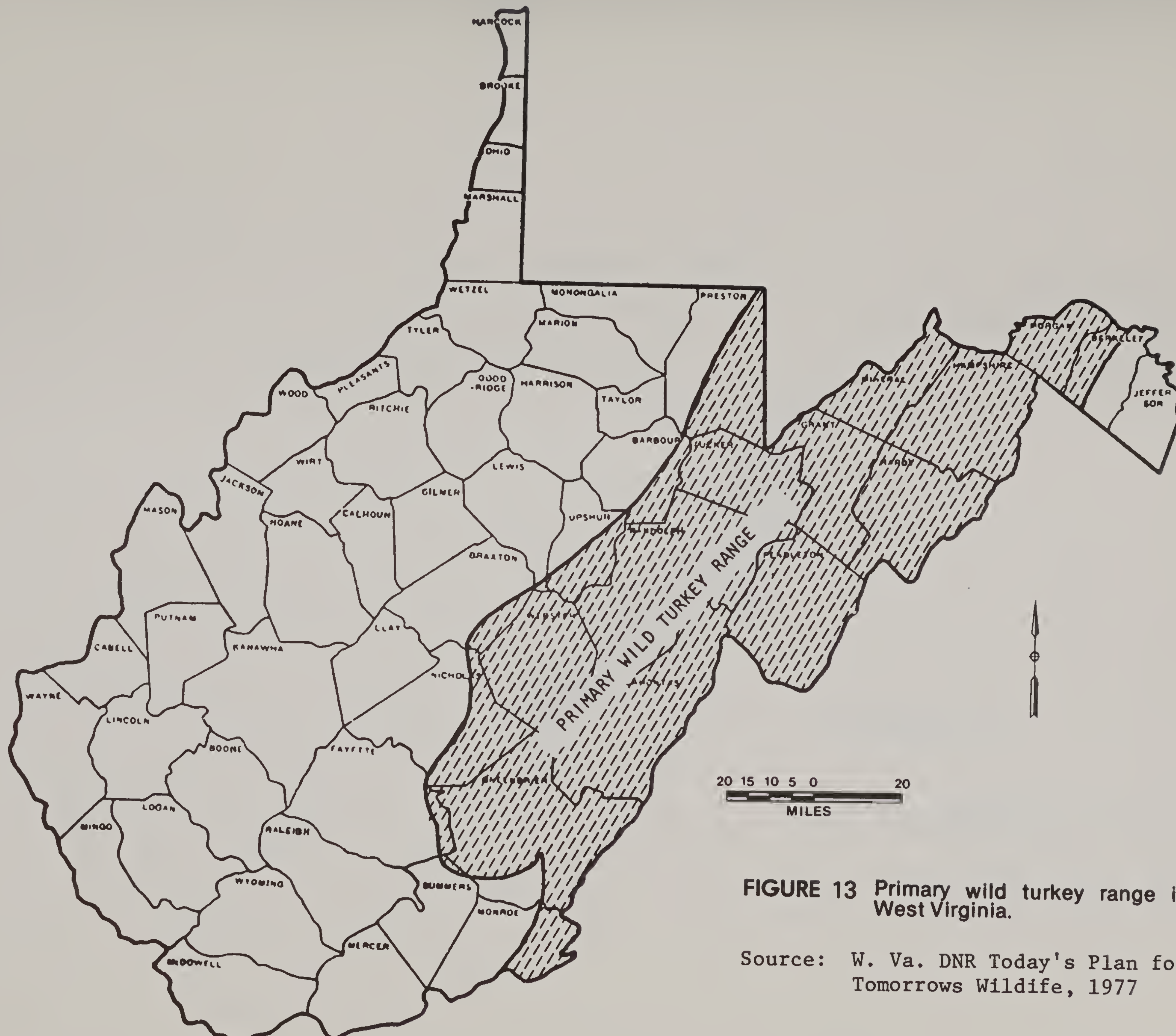


FIGURE 13 Primary wild turkey range in West Virginia.

Source: W. Va. DNR Today's Plan for Tomorrows Wildife, 1977

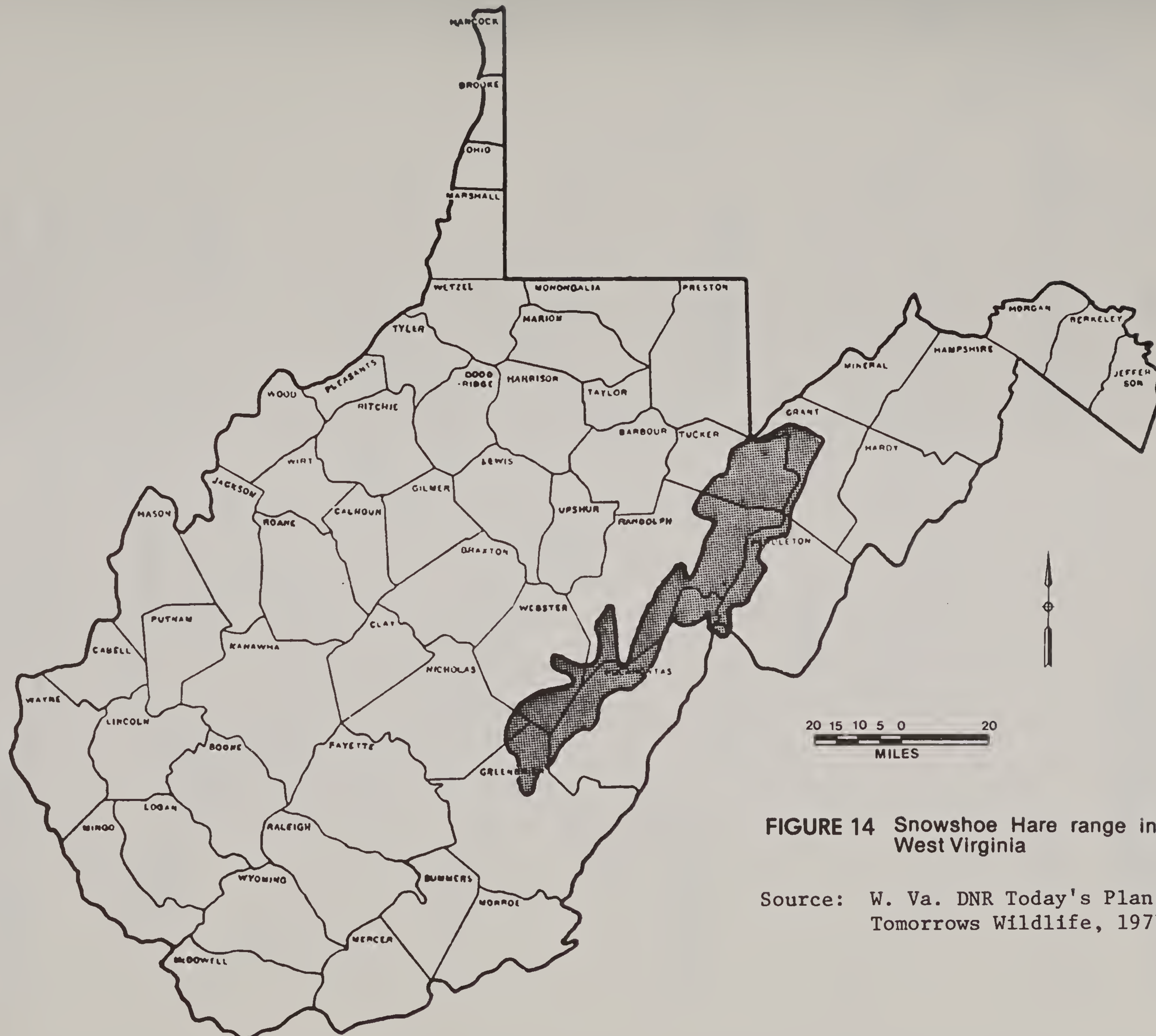


FIGURE 14 Snowshoe Hare range in West Virginia

Source: W. Va. DNR Today's Plan for Tomorrows Wildlife, 1977

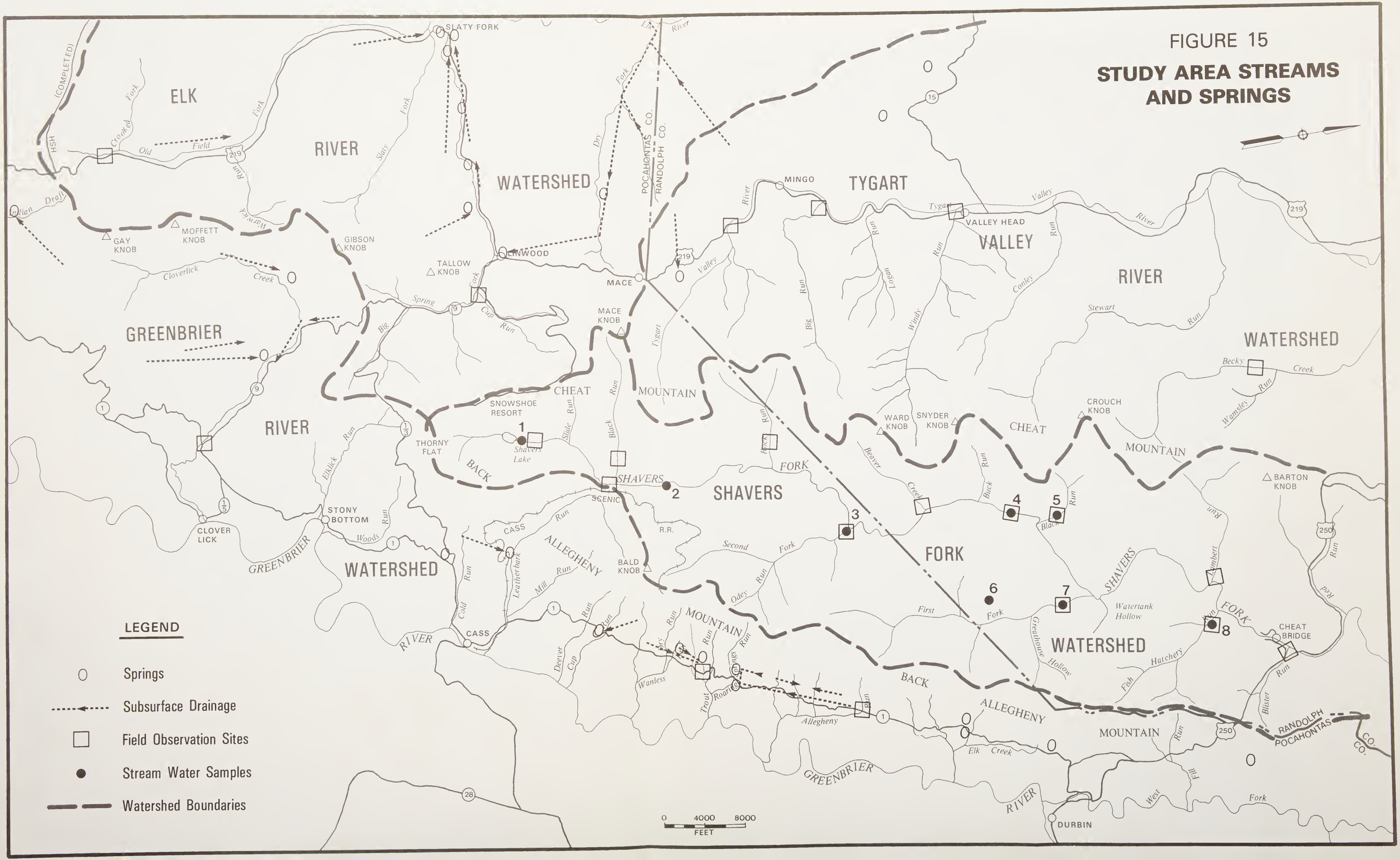


FIGURE 15
STUDY AREA STREAMS AND SPRINGS
ELK
RIVER
WATERSHED
GREENBRIER
RIVER
WATERSHED
TYGART
VALLEY
RIVER
WATERSHED
SHAVERS
FORK
WATERSHED
CHEAT
MOUNTAIN
BACK
ALLEGHENY
MOUNTAIN
SLATY FORK
LINWOOD
MACE
MACE KNOB
MINGO
VALLEY HEAD
GAY KNOB
MOFFETT KNOB
GIBSON KNOB
TALLOW KNOB
SNOWSHOE RESORT
THORNY FLAT
SHAVERS
SCENIC
BALD KNOB
STONY BOTTOM
CLOVER LICK
CASS
WARD KNOB
SNYDER KNOB
CROUCH KNOB
BARTON KNOB
CHEAT BRIDGE
DURBIN
POCAHONTAS CO.
RANDOLPH CO.
LEGEND
Springs
Subsurface Drainage
Field Observation Sites
Stream Water Samples
Watershed Boundaries
0 4000 8000
FEET

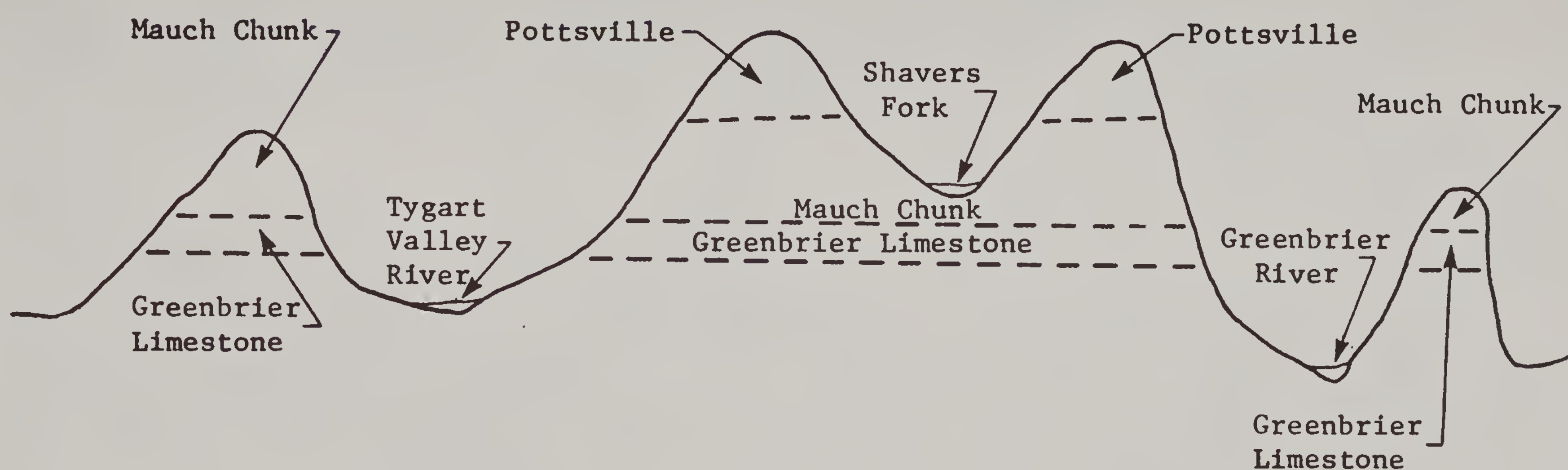


FIGURE 16
WATERSHED GEOLOGY

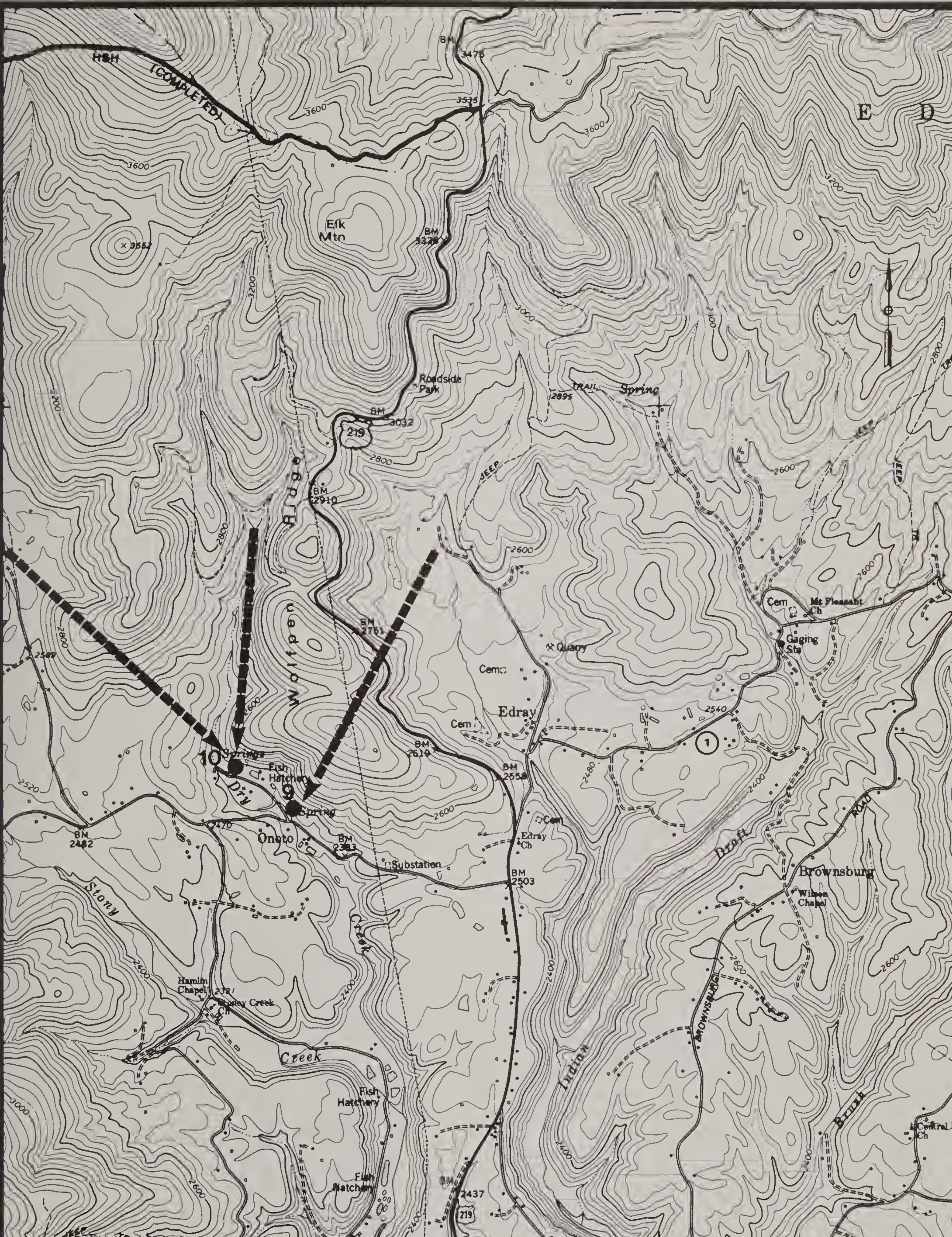
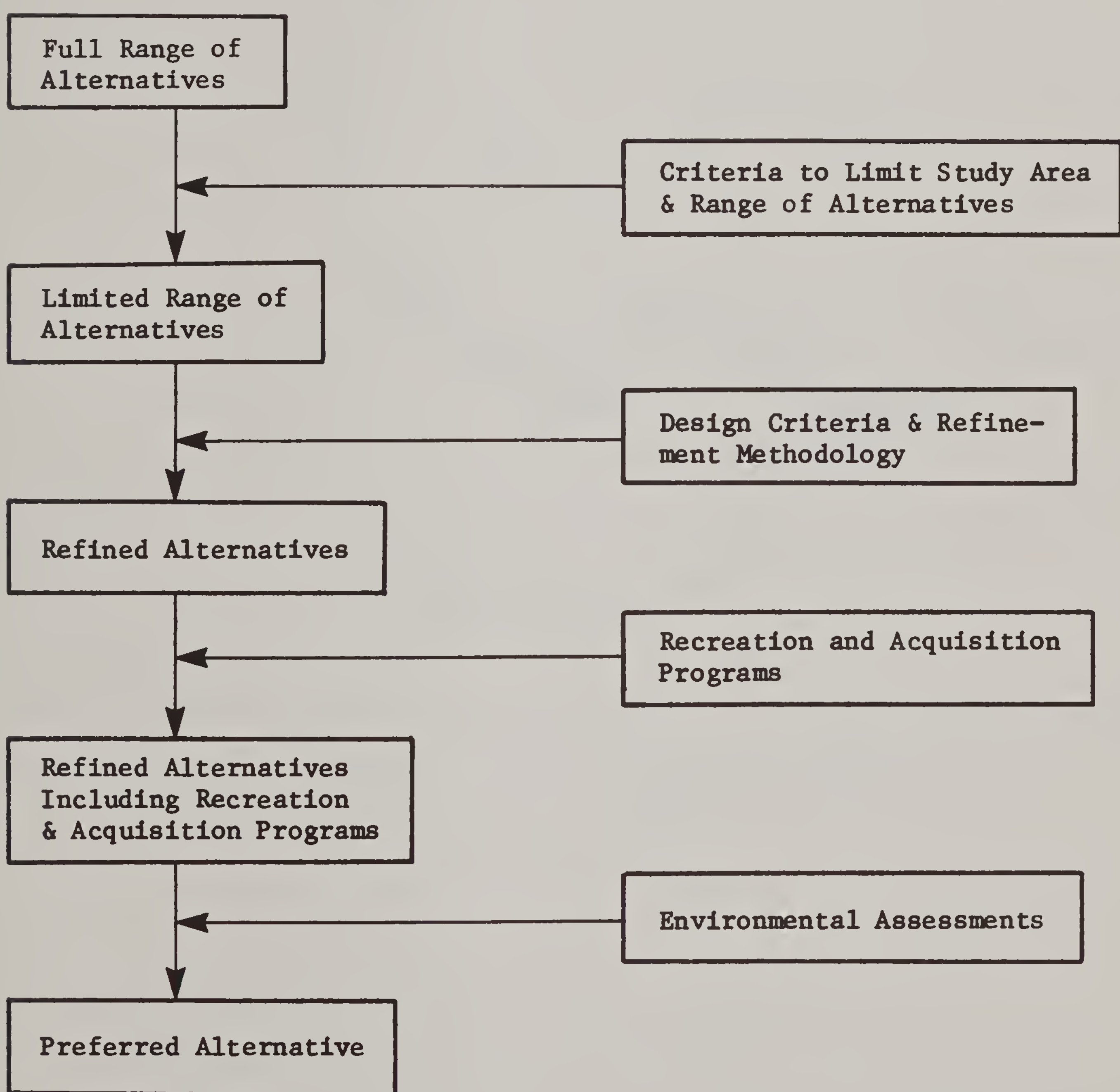


FIGURE 17

LOCATION OF SPRINGS AND SUBSURFACE DRAINAGE EDRAY FISH HATCHERY

FIGURE 18

PROCESS FOR LIMITING, REFINING, AND EVALUATING ALTERNATIVES



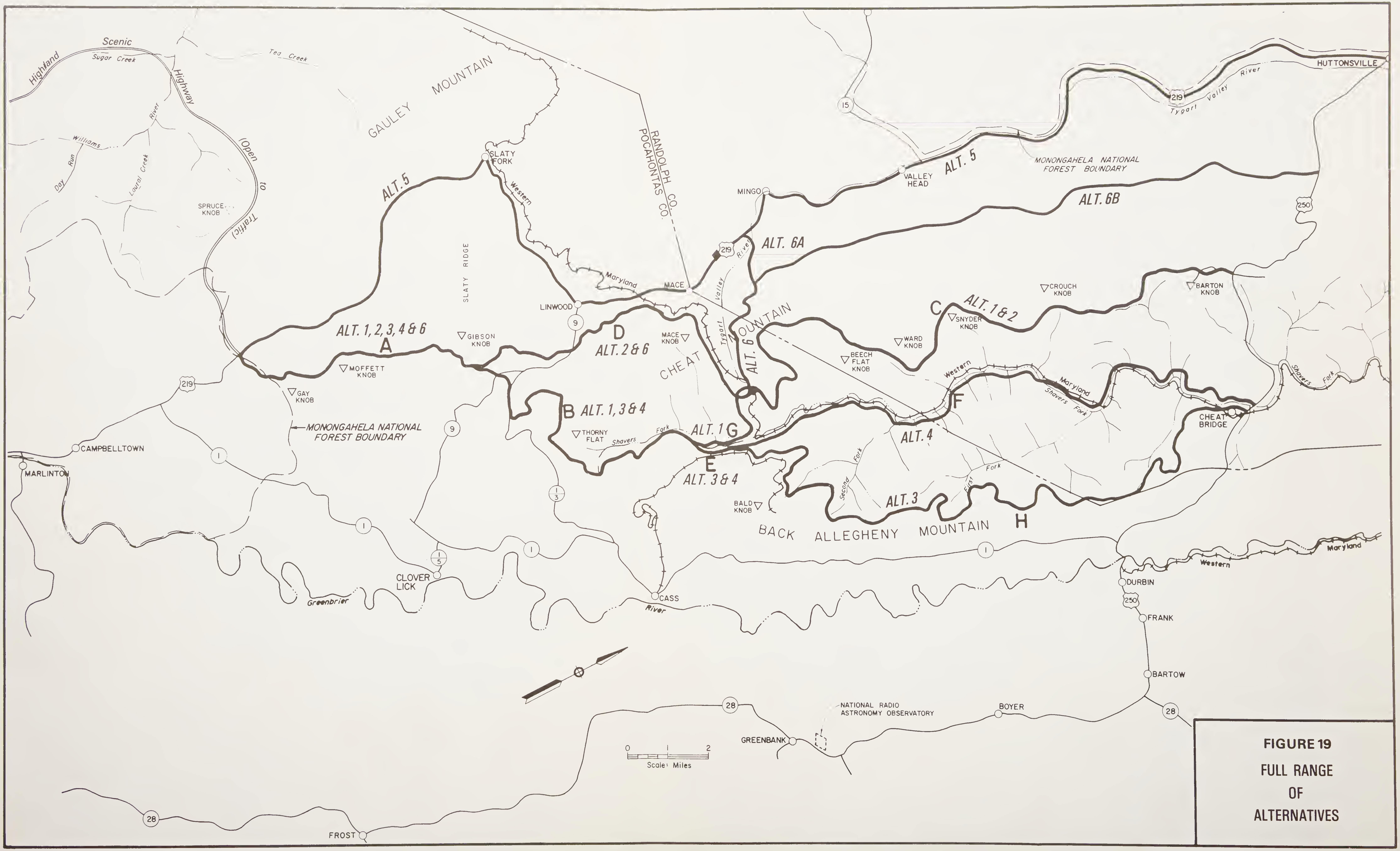


FIGURE 19

FULL RANGE OF ALTERNATIVES

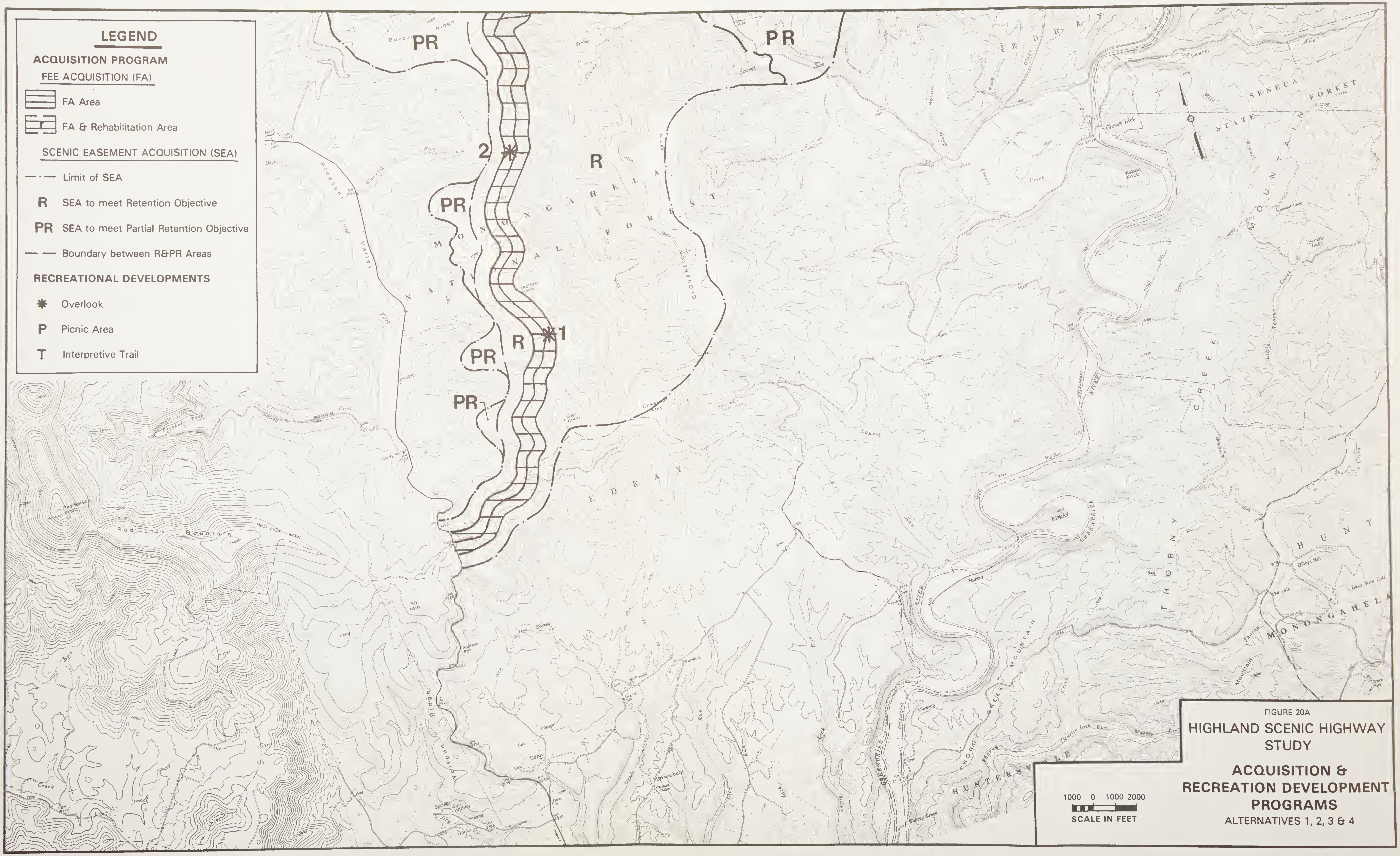


FIGURE 20A
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVES 1, 2, 3 & 4

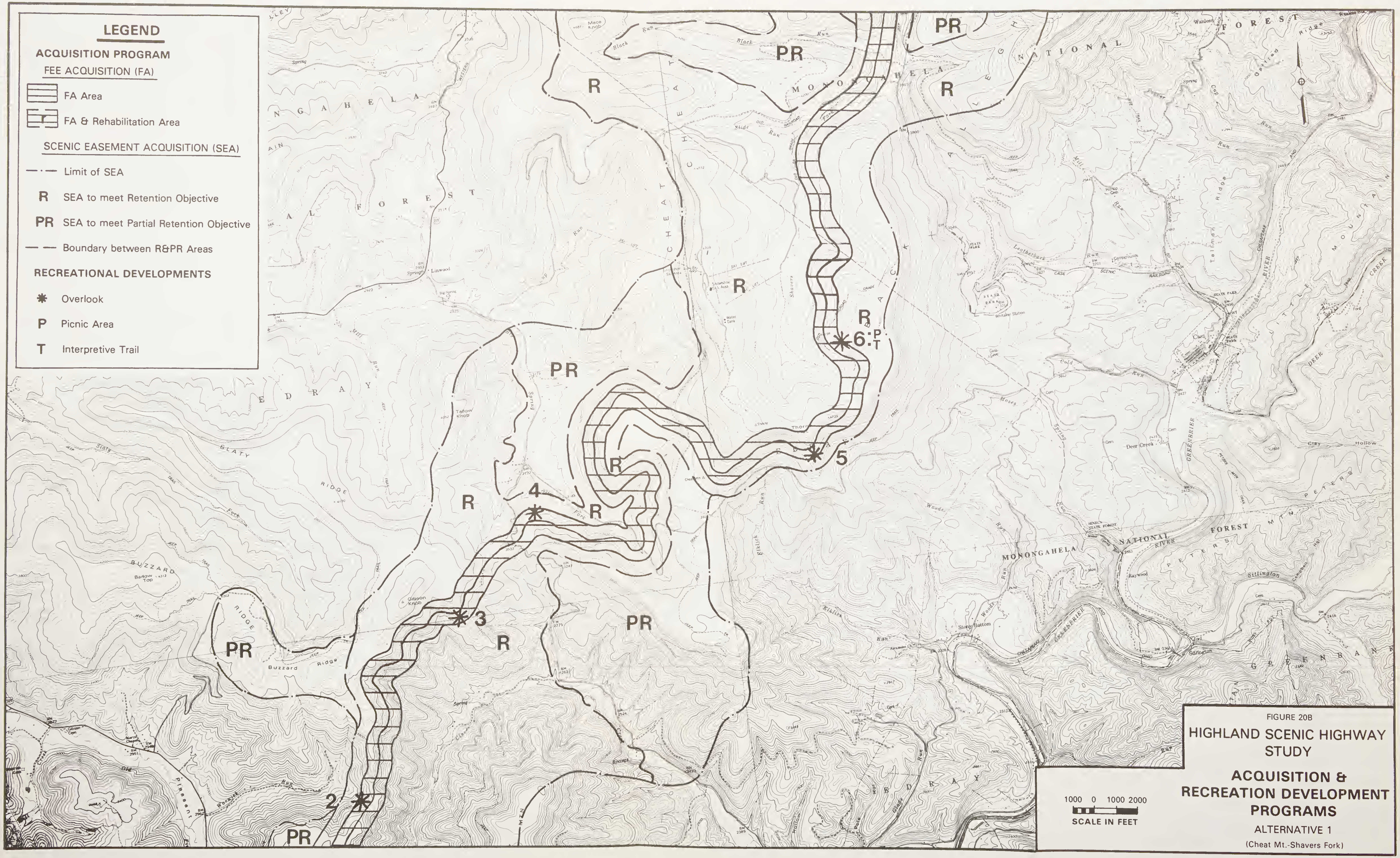
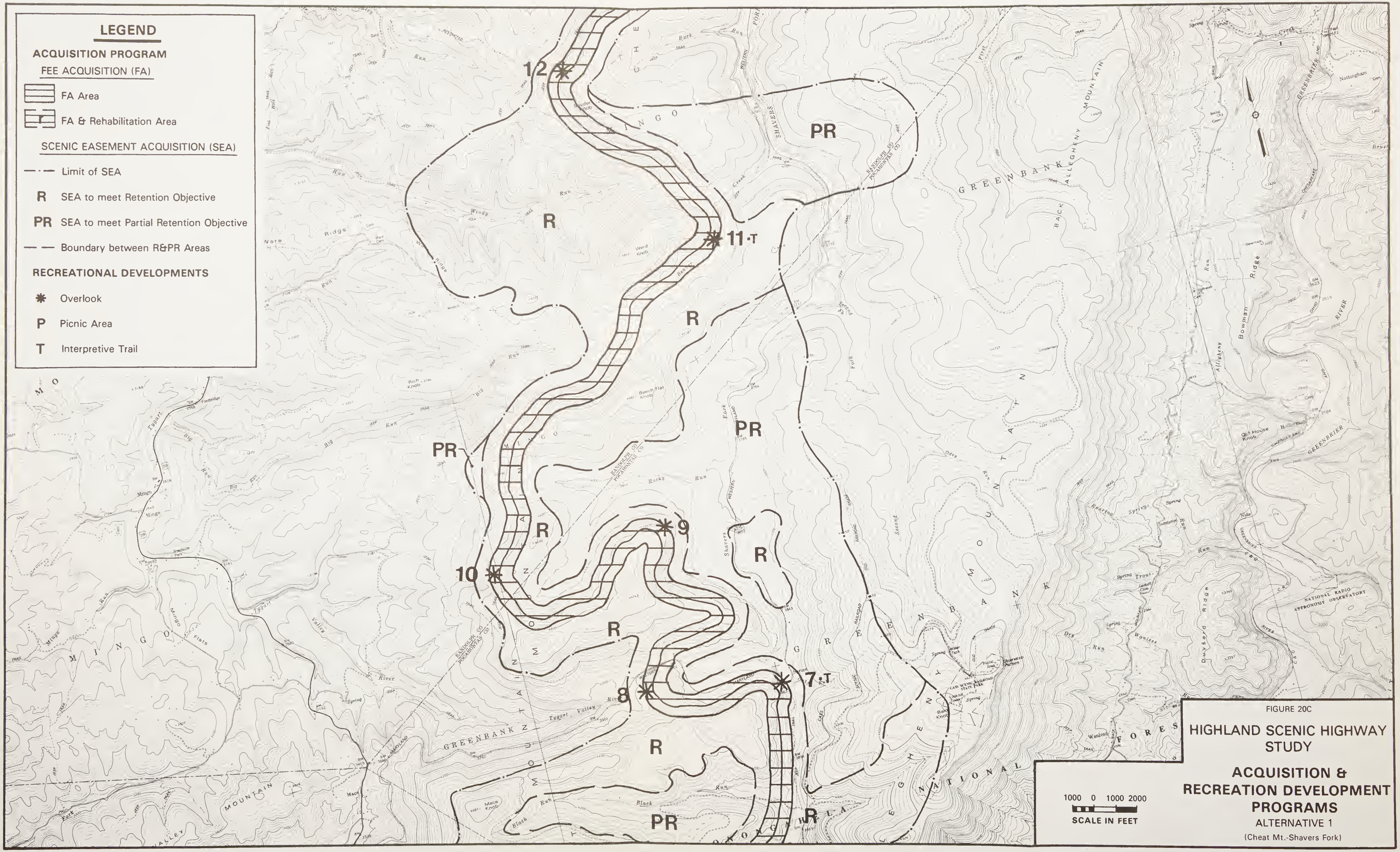


FIGURE 20B
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 1
(Cheat Mt.-Shavers Fork)


LEGEND
ACQUISITION PROGRAM
FEE ACQUISITION (FA)
FA Area
FA & Rehabilitation Area
SCENIC EASEMENT ACQUISITION (SEA)
Limit of SEA
R SEA to meet Retention Objective
PR SEA to meet Partial Retention Objective
Boundary between R&PR Areas
RECREATIONAL DEVELOPMENTS
Overlook
P Picnic Area
T Interpretive Trail
12
11·T
10
9
8
7·T
R
PR
1000 0 1000 2000
SCALE IN FEET
FIGURE 20C
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 1
(Cheat Mt.-Shavers Fork)

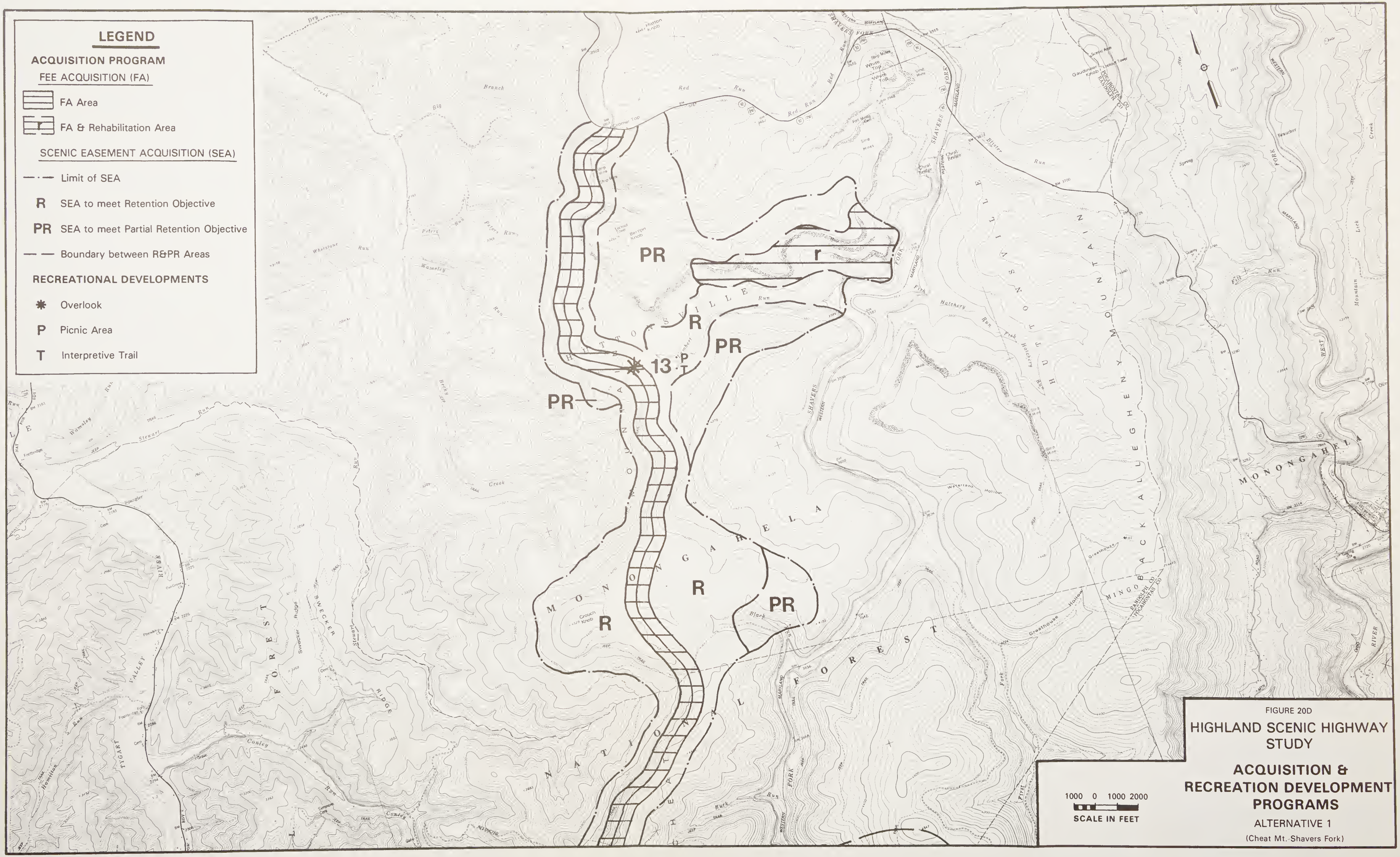


FIGURE 20D

HIGHLAND SCENIC HIGHWAY STUDY

ACQUISITION & RECREATION DEVELOPMENT PROGRAMS

ALTERNATIVE 1

(Cheat Mt.-Shavers Fork)

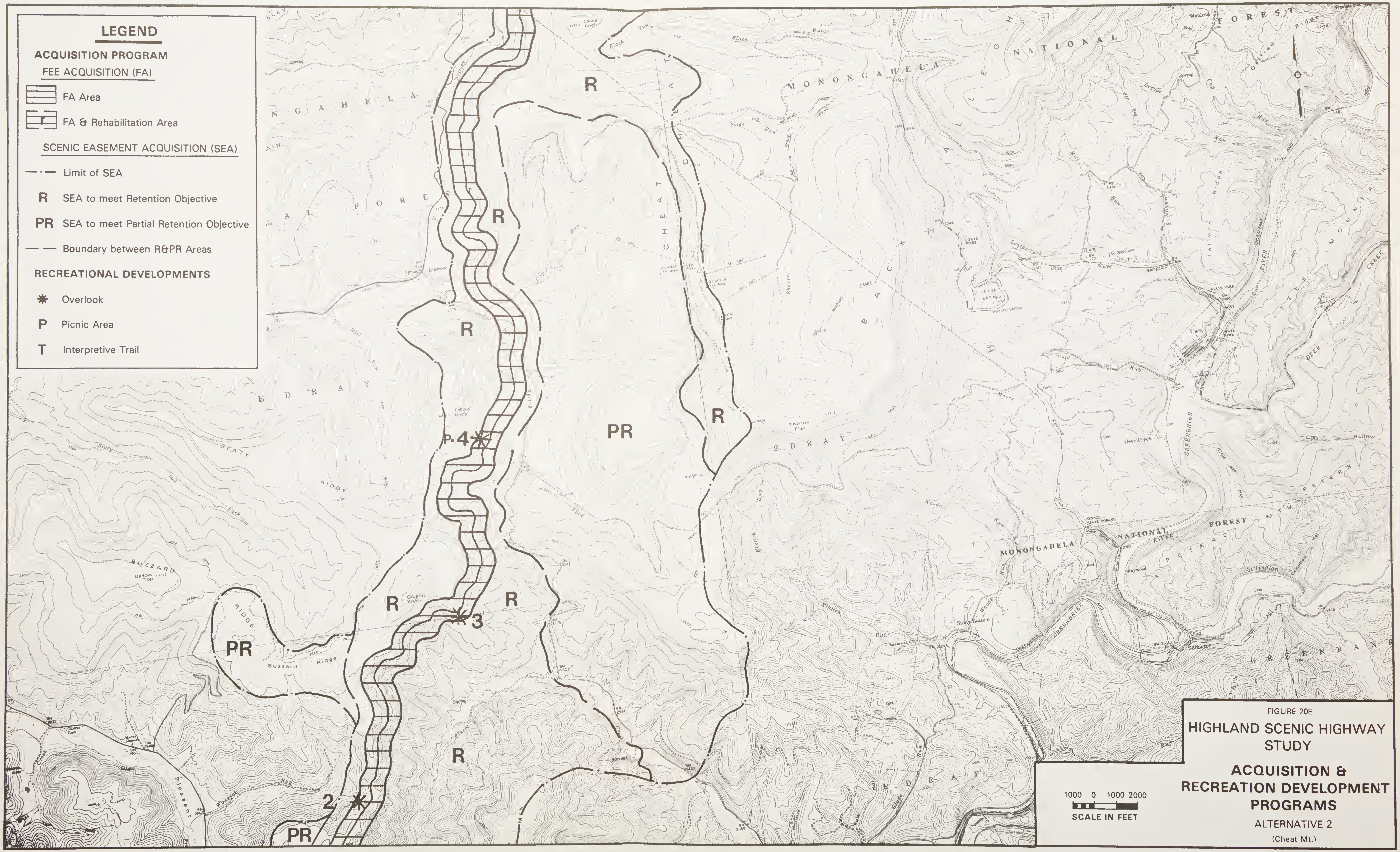


FIGURE 20E
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 2
(Cheat Mt.)

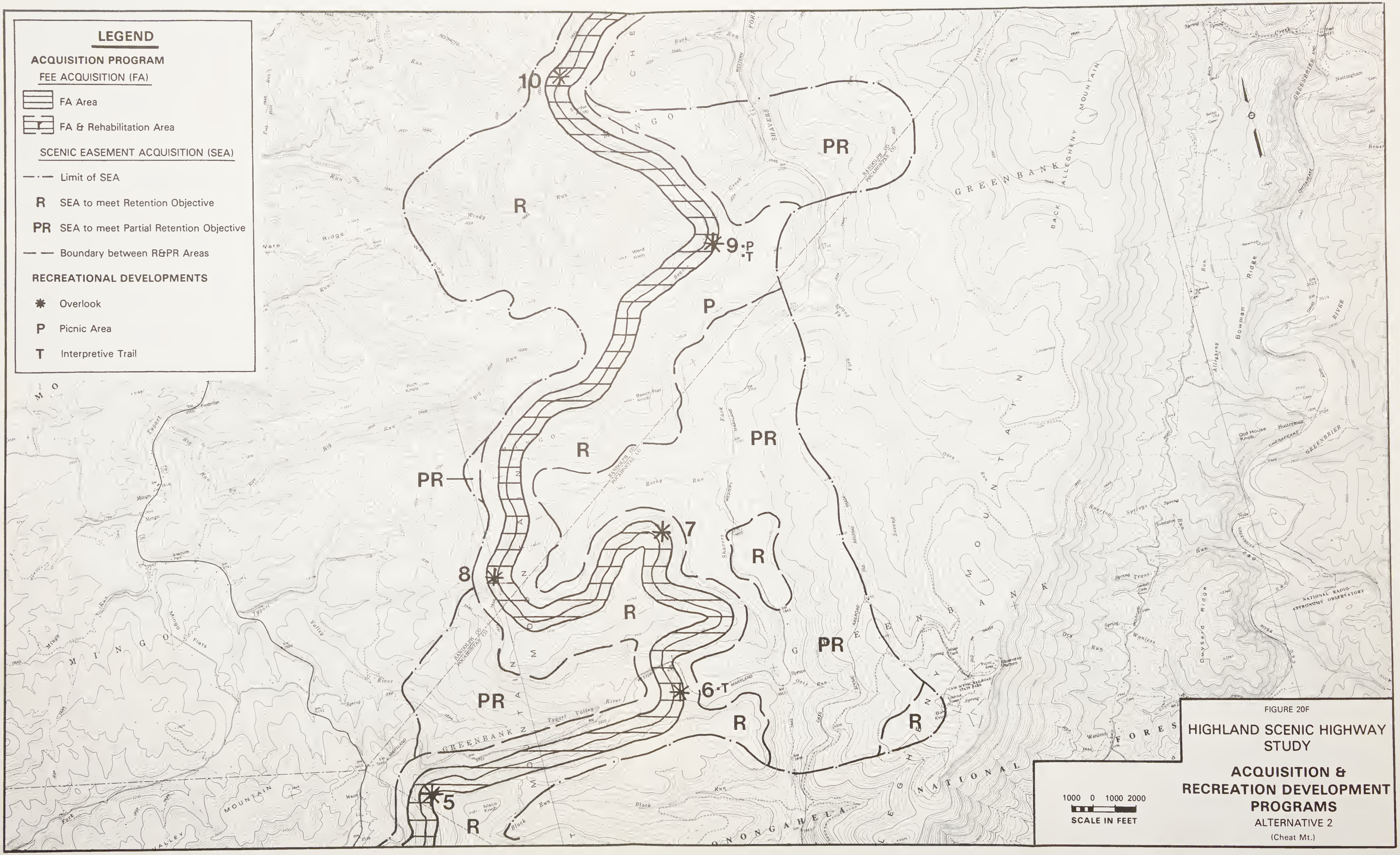


FIGURE 20F
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 2
(Cheat Mt.)

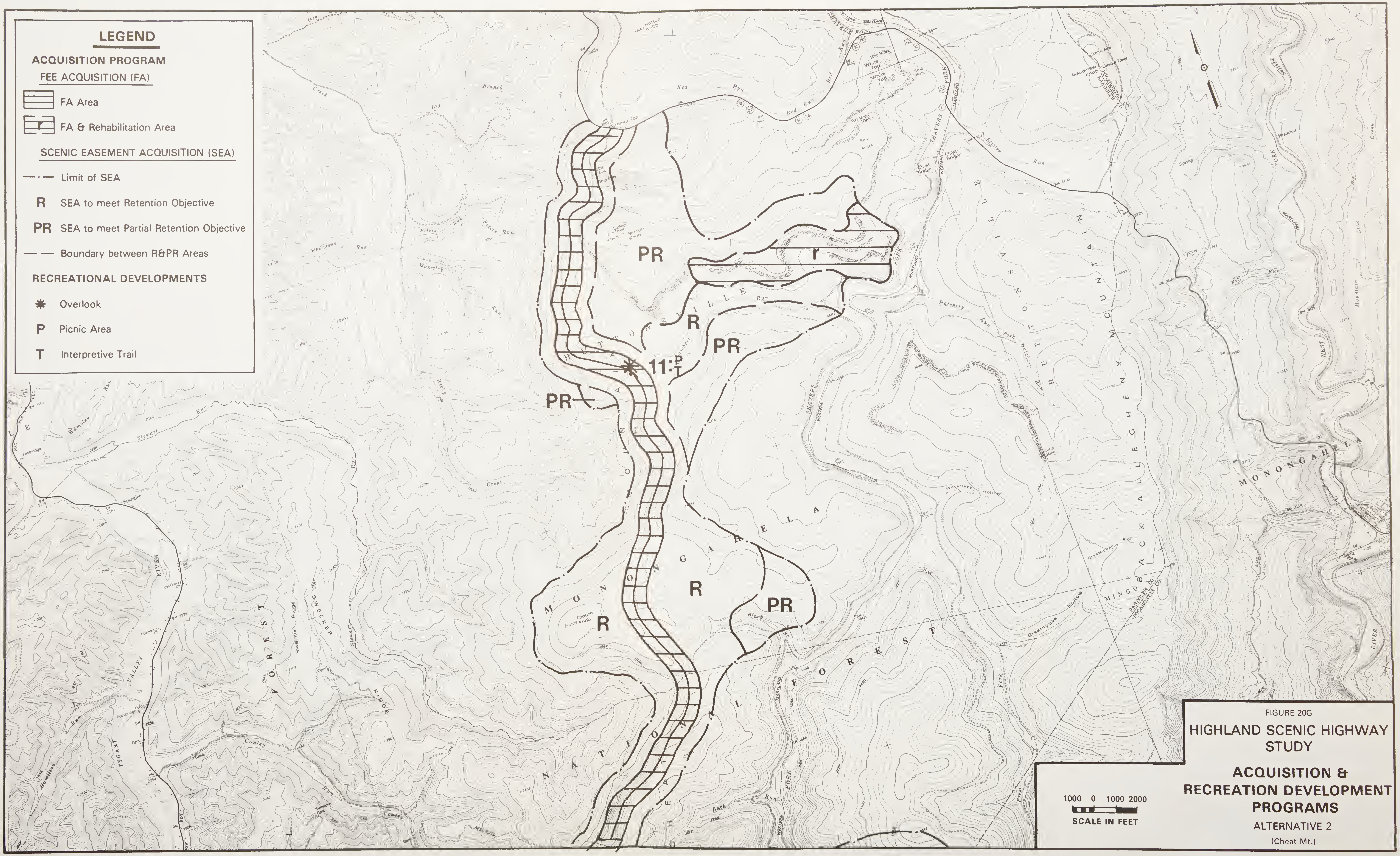


FIGURE 20G
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 2
(Cheat Mt.)

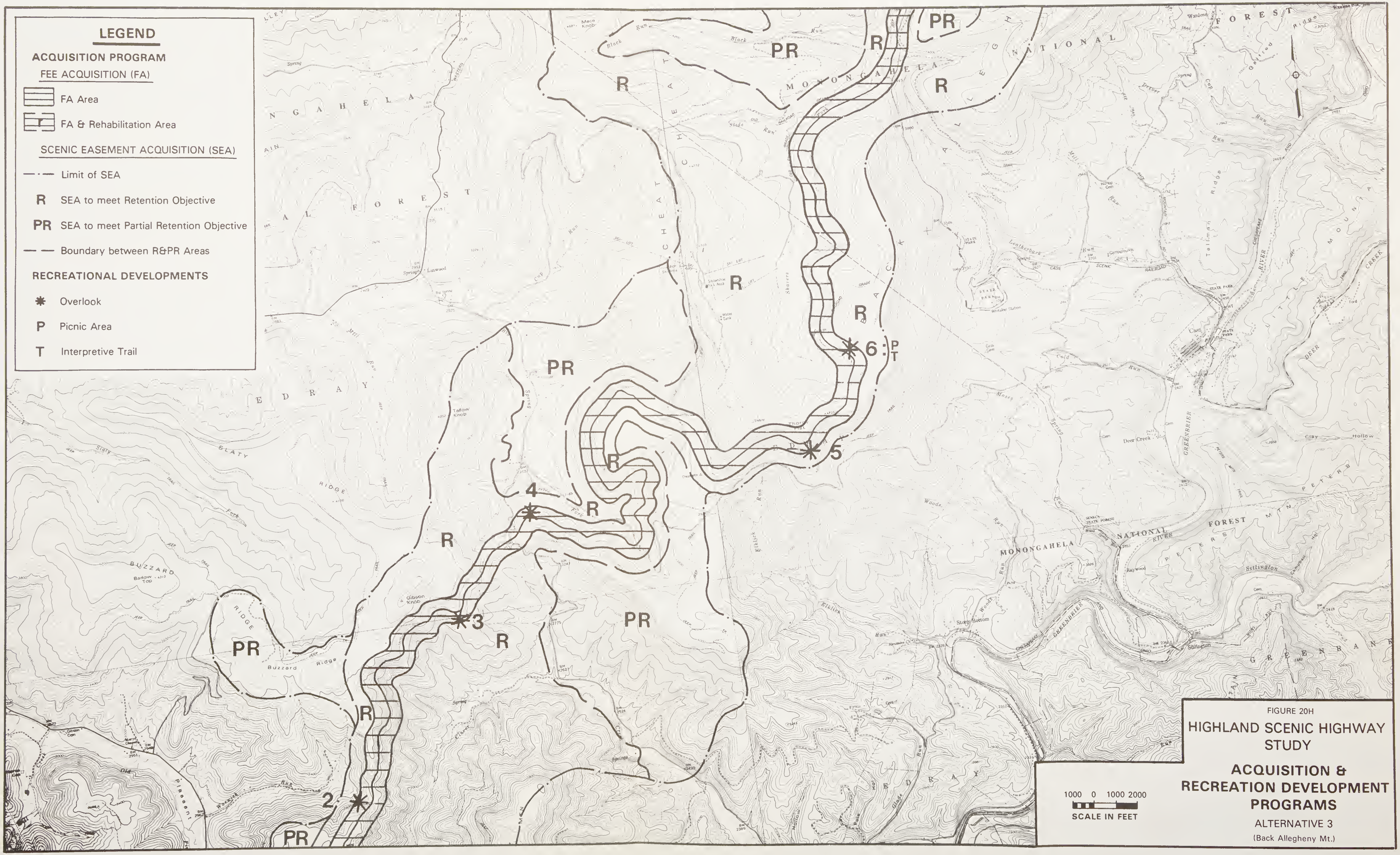


FIGURE 20H

HIGHLAND SCENIC HIGHWAY STUDY

ACQUISITION & RECREATION DEVELOPMENT PROGRAMS

ALTERNATIVE 3

(Back Allegheny Mt.)

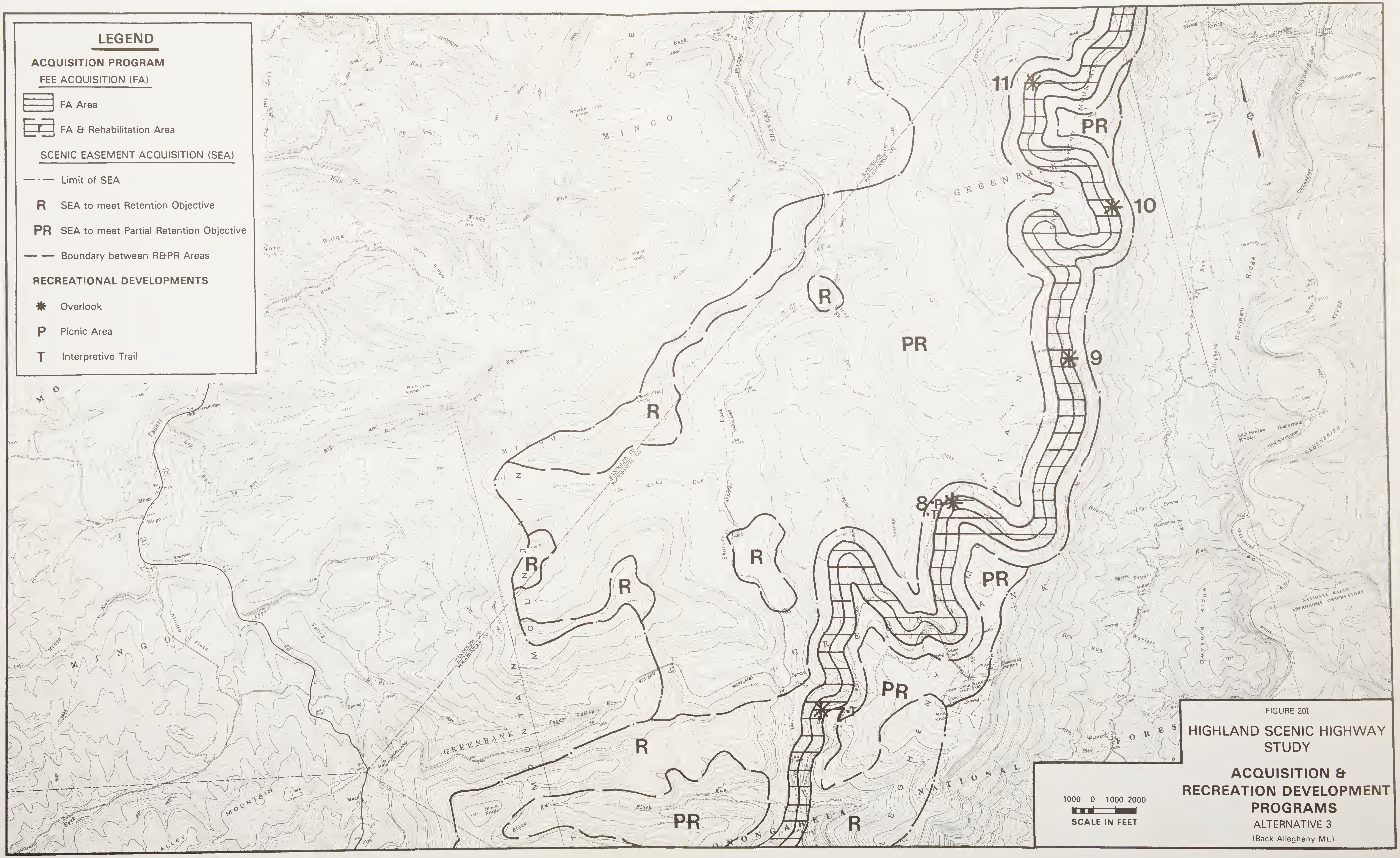


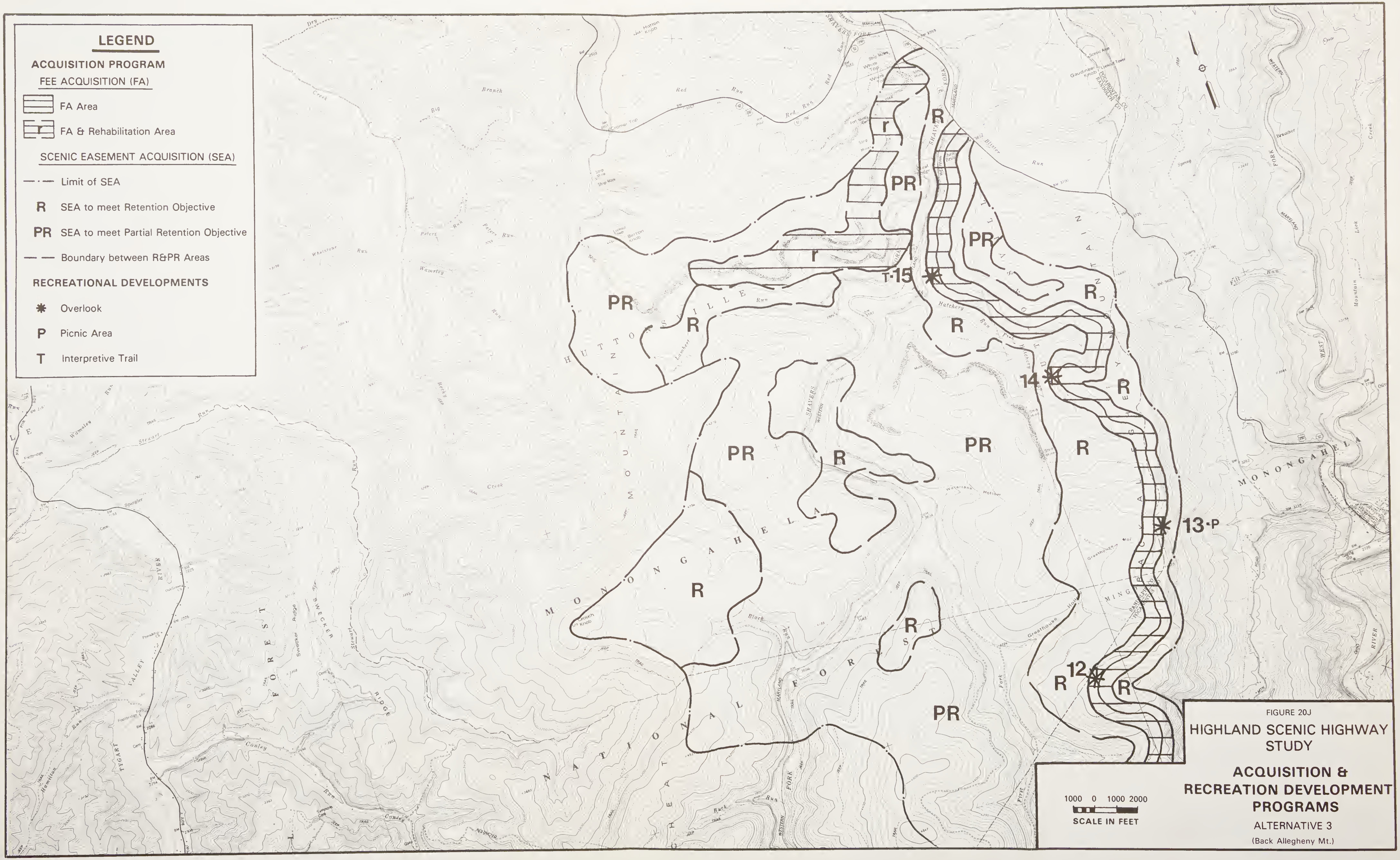
FIGURE 20I

HIGHLAND SCENIC HIGHWAY STUDY

ACQUISITION & RECREATION DEVELOPMENT PROGRAMS

ALTERNATIVE 3

(Back Allegheny Mt.)



LEGEND
ACQUISITION PROGRAM
FEE ACQUISITION (FA)
FA Area
FA & Rehabilitation Area
SCENIC EASEMENT ACQUISITION (SEA)
Limit of SEA
R SEA to meet Retention Objective
PR SEA to meet Partial Retention Objective
Boundary between R&PR Areas
RECREATIONAL DEVELOPMENTS
Overlook
P Picnic Area
T Interpretive Trail
T-15
14
13·P
12
MONONGAHELA NATIONAL FOREST
HUTTONSVILLE
SHAVERS FORK
1000 0 1000 2000
SCALE IN FEET
FIGURE 20J
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 3
(Back Allegheny Mt.)

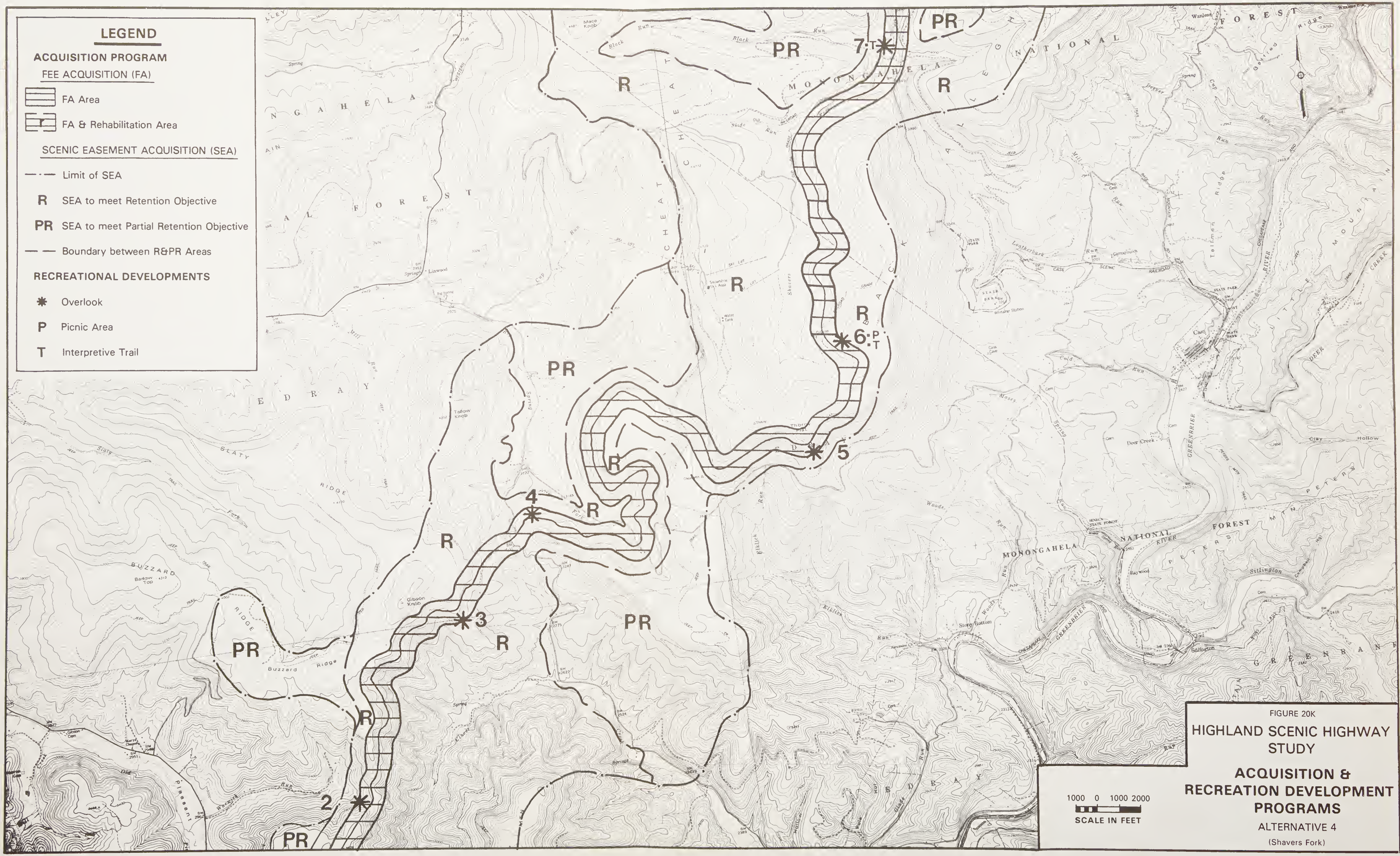


FIGURE 20K
HIGHLAND SCENIC HIGHWAY STUDY

ACQUISITION & RECREATION DEVELOPMENT PROGRAMS

ALTERNATIVE 4

(Shavers Fork)

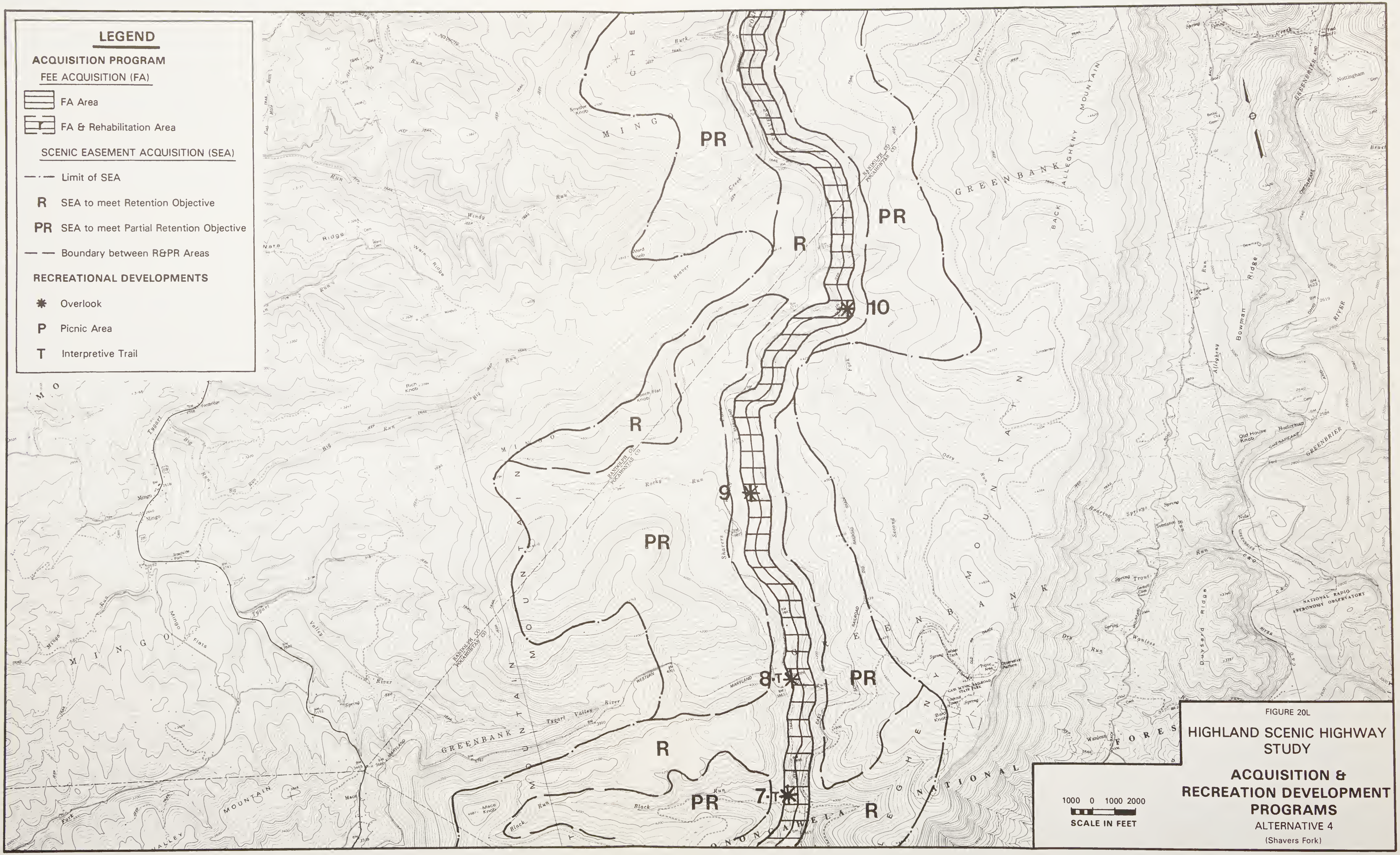


FIGURE 20L

HIGHLAND SCENIC HIGHWAY STUDY

ACQUISITION & RECREATION DEVELOPMENT PROGRAMS

ALTERNATIVE 4

(Shavers Fork)

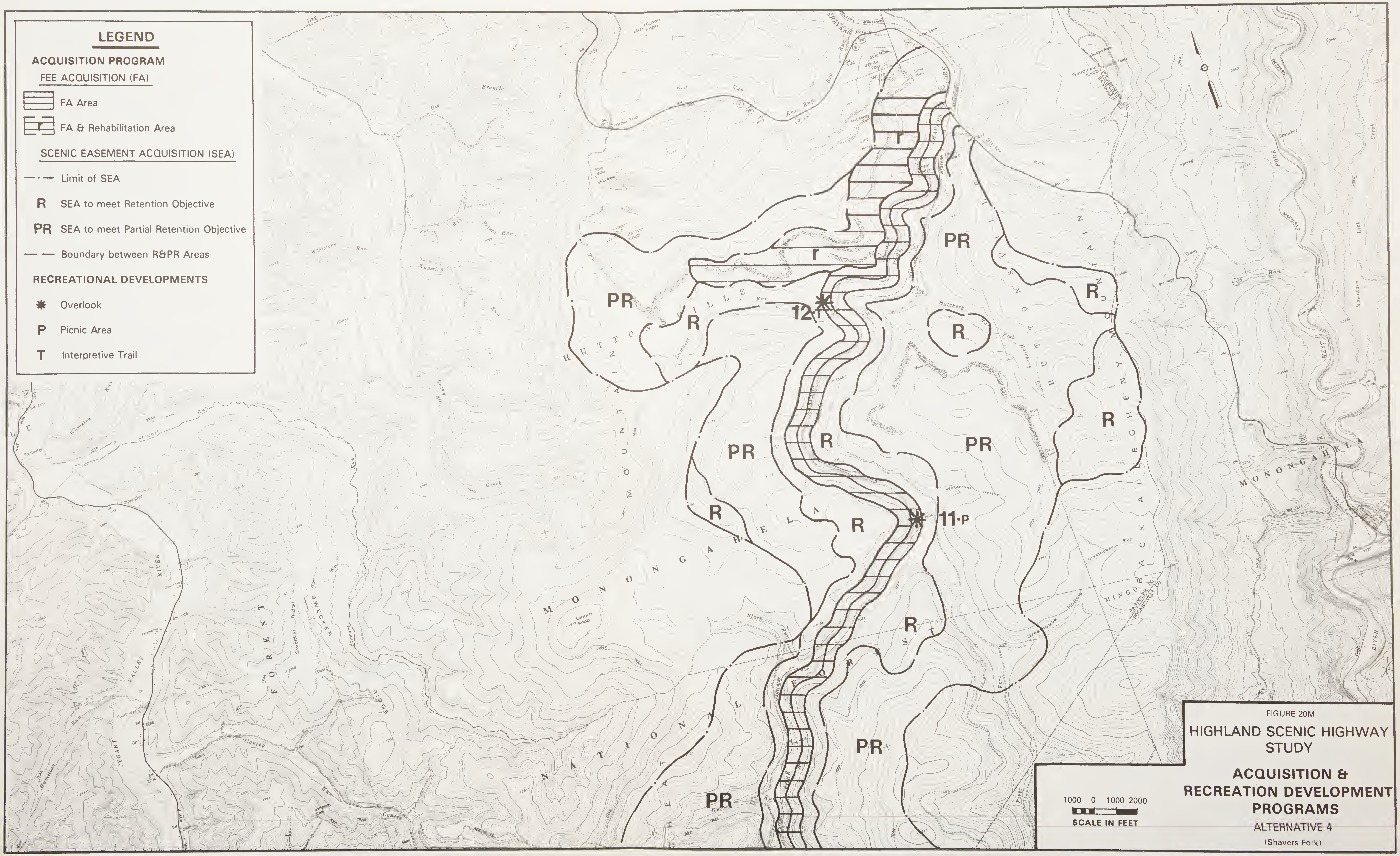


FIGURE 20M
HIGHLAND SCENIC HIGHWAY STUDY
ACQUISITION & RECREATION DEVELOPMENT PROGRAMS
ALTERNATIVE 4
(Shavers Fork)

HIGHLAND SCENIC HIGHWAY STUDY
PROTOTYPICAL OVERLOOKS

Synterra Ltd.
development planning, landscape architecture
philadelphia · new york · washington · los angeles

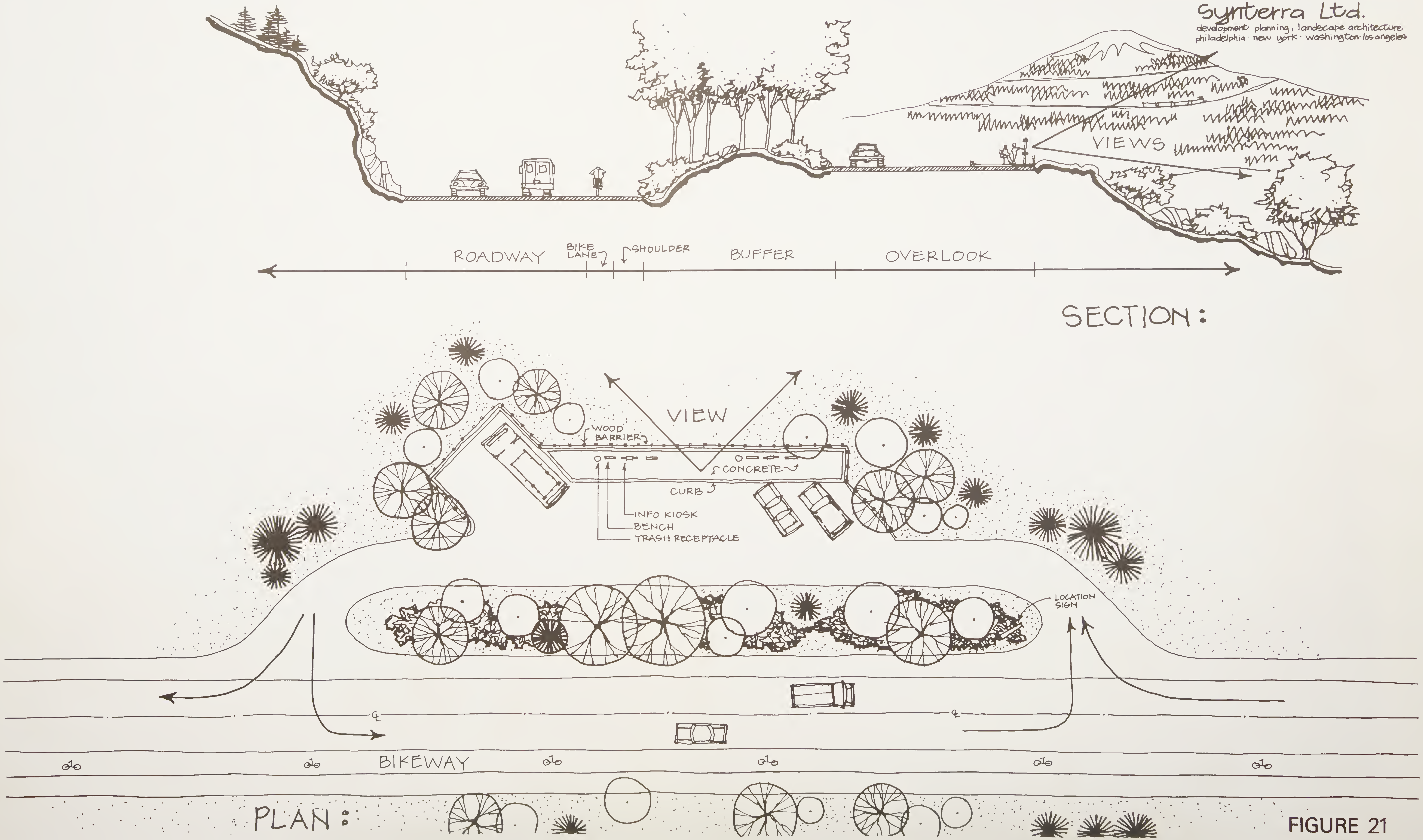


FIGURE 21

HIGHLAND SCENIC HIGHWAY STUDY
PROTOTYPICAL OVERLOOKS

Synterra Ltd.
development planning, landscape architecture
philadelphia · new york · washington · los angeles

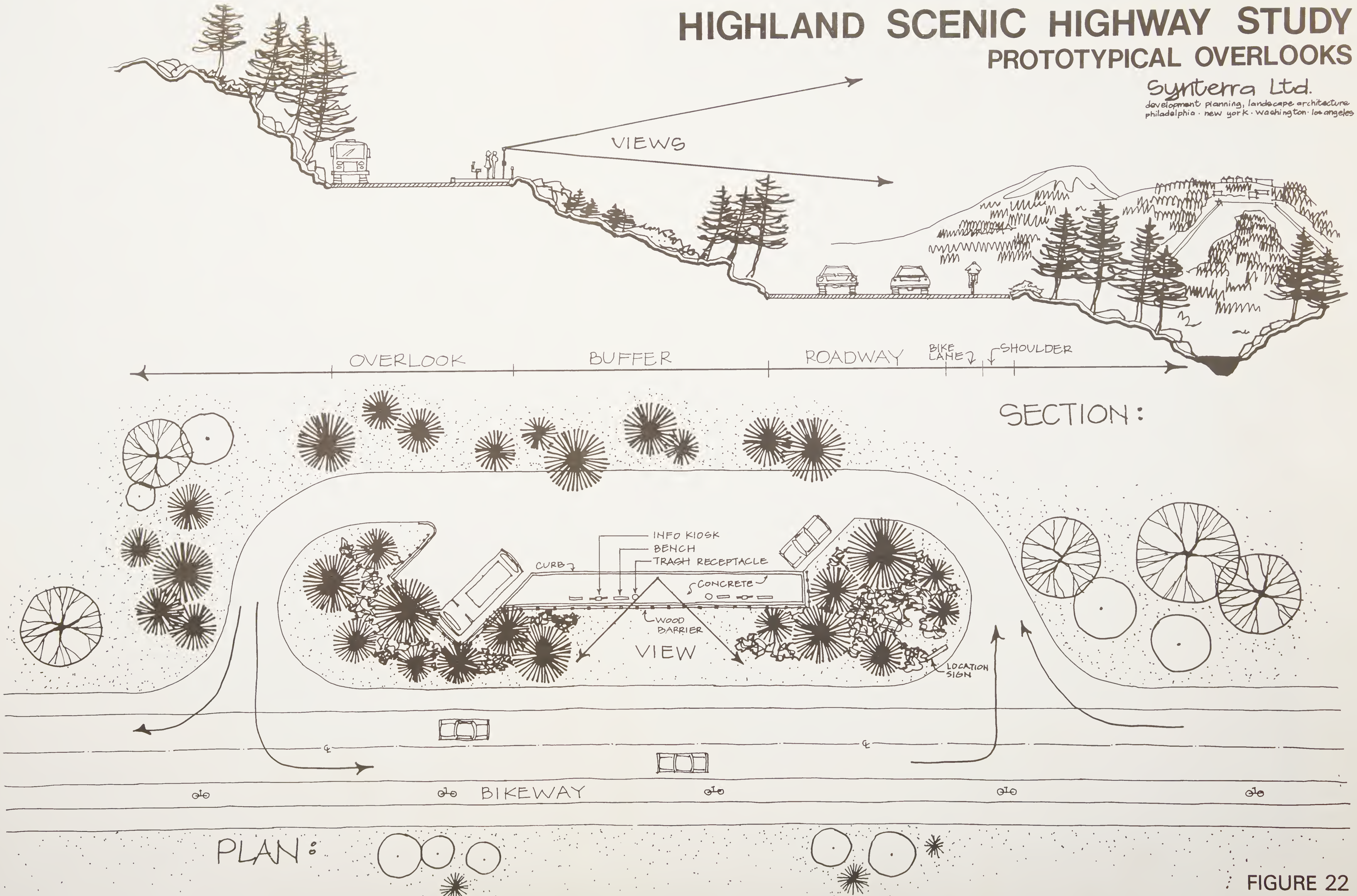


FIGURE 22

HIGHLAND SCENIC HIGHWAY STUDY
PROTOTYPICAL OVERLOOK
INTERPRETIVE TRAIL
PICNIC AREA

Synterra Ltd.
development planning, landscape architecture
philadelphia · new york · washington · los angeles

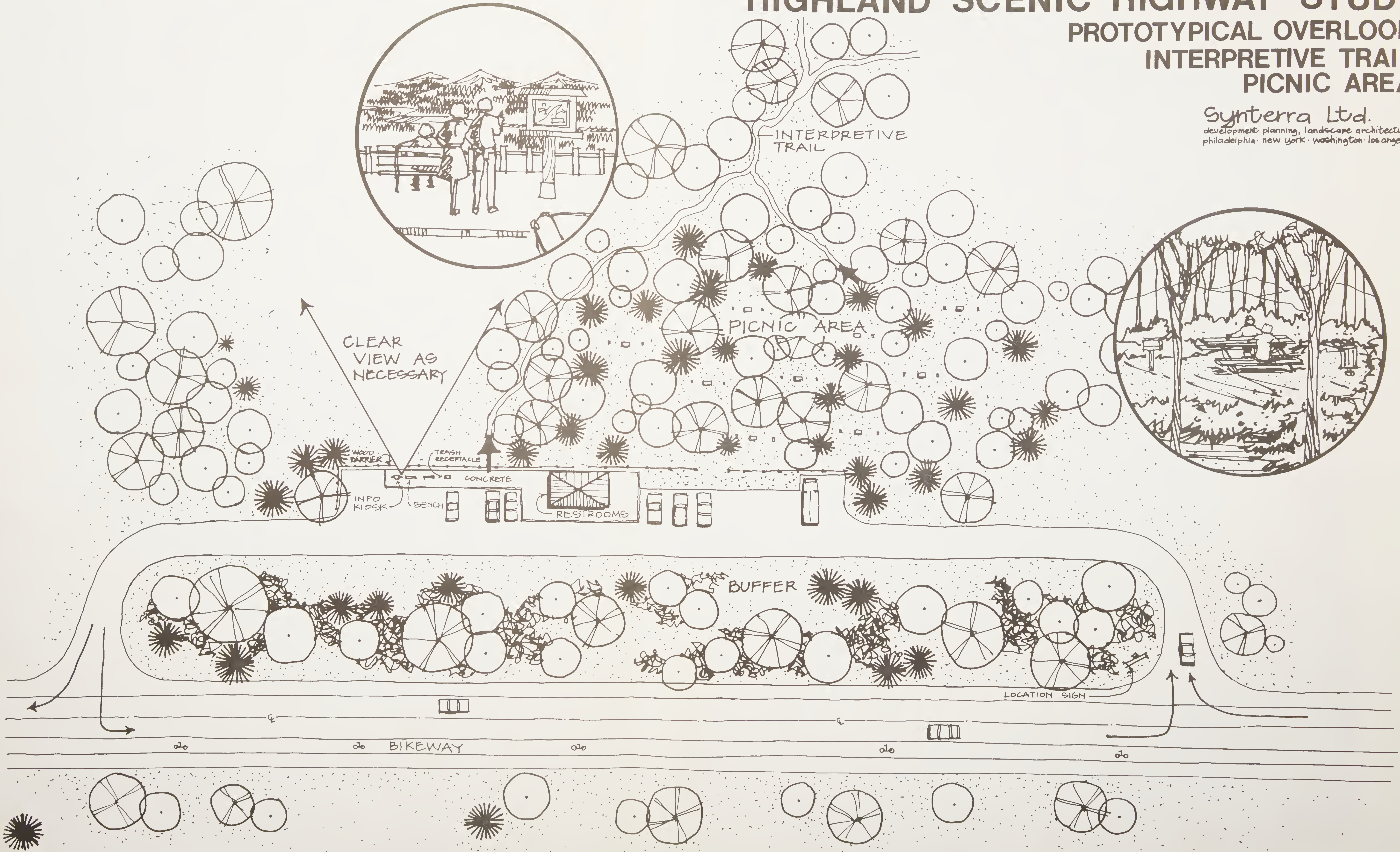


FIGURE 23

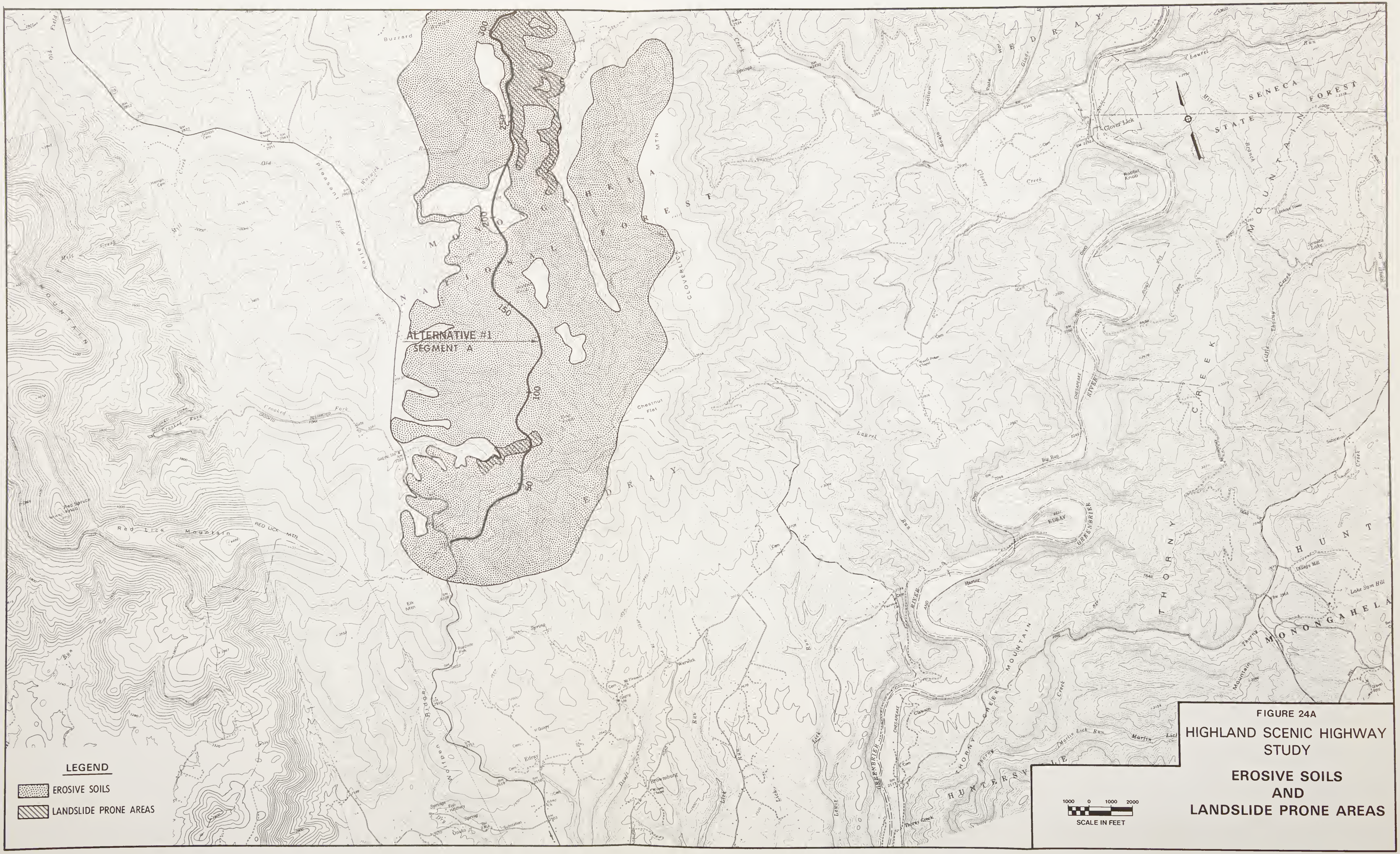


FIGURE 24A
HIGHLAND SCENIC HIGHWAY STUDY
EROSIVE SOILS AND LANDSLIDE PRONE AREAS

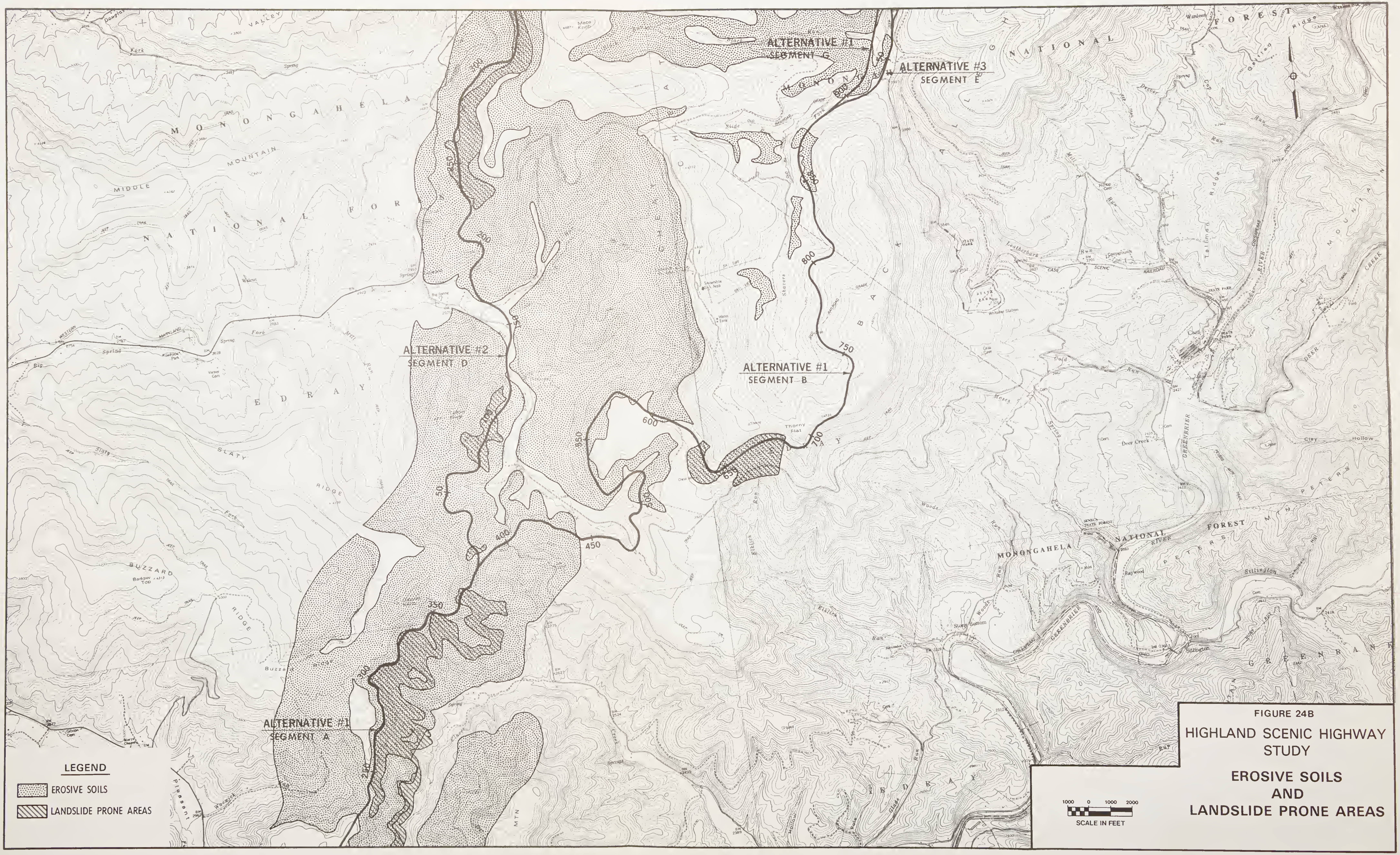


FIGURE 24B

HIGHLAND SCENIC HIGHWAY STUDY

EROSIVE SOILS AND LANDSLIDE PRONE AREAS

FIGURE 24C

HIGHLAND SCENIC HIGHWAY STUDY

EROSIVE SOILS AND LANDSLIDE PRONE AREAS

FIGURE 24D
HIGHLAND SCENIC HIGHWAY STUDY
EROSIVE SOILS AND LANDSLIDE PRONE AREAS

APPENDIX C

LITERATURE CITED

APPENDIX C

LITERATURE CITED

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APPENDIX D

SOIL SERIES

Several soil series, as established by the U.S. Department of Agriculture, Soil Conservation Service, are found in the area under study for the extension of the Highland Scenic Highway. These soils include those which are residual, colluvial and alluvial in origin. The residual soils are the most common.

Brief descriptions of the soils in the study area in accordance with USDA soil resource inventory and survey reports[7 8] follows. More detailed information on the study area's soils can be found in the "Soils and Geology Technical Report".[6]

a. Atkins Series

The Atkins Series consists of deep, poorly drained soils occuring on terraces and floodplains. The soil's sediments washed mainly from acid shale, siltstone and sandstone.

b. Belmont Series

The Belmont Series consists of moderately deep to deep, gentle to very steeply sloping, well drained soils in a benched, mountainous landscape. The soils were derived from limestone, limy shale, acid shale and sandstone.

c. Brinkerton Series

The Brinkerton Series consists of deep, gentle to moderately sloping, somewhat poorly and poorly drained soils. The soils occur in a mountainous plateau landscape at the heads of streams, in seepage spots and nearly level areas along drainages. The soils were derived from acid shale, siltstone and sandstone.

d. Calvin Neutral Substratum (Teas) Series

The Teas Series consists of moderately deep to deep, gentle to steeply sloping, well drained soils in a benched, mountainous landscape. The soils, which normally occur in the upper part of the landscape, were derived from acid and limy shale, siltstone and sandstone.

e. Cookport Series

The Cookport Series consists of moderately deep to deep, gentle to moderately sloping, moderately well drained soils in a hilly and plateau like landscape. The soils occur on nearly level broad flats and sloping benches and were derived from acid sandstone, shale and siltstone.

f. Dekalb Series

The Dekalb Series consists of moderately deep to deep, gentle to steeply sloping, well drained soils in a mountainous landscape. The soils occur on both mountain tops and side slopes and were derived from acid sandstone.

g. Ernest Series

The Ernest Series consists of deep, gentle to moderately steep, moderately well drained soils in a hilly and plateau like landscape. The soils occur on footslopes along drainageways and in coves and were derived from acid shale, sandstone and siltstone.

h. Lickdale Series

The Lickdale Series consists of deep, level or nearly level, very poorly drained soils occurring on upland flats and depressions as colluvium. The soils were derived from acid sandstone and shale.

i. Meckesville Series

The Meckesville Series consists of deep, gentle to steeply sloping, well drained soils occuring as colluvium. The soils derived from acid sandstone, limestone, acid and limy shale.

j. Nolo Series

The Nolo Series consists of moderately deep to deep, nearly level, somewhat poorly to poorly drained soils occurring in a mountainous landscape on level ridgetops and benches. The soils were derived from acid sandstone and shale.

k. Pope Series

The Pope Series consists of deep, nearly level to gently sloping, well drained soils occurring on tarraces and floodplains. The soils were derived from acid sandstone, shale and siltstone.

APPENDIX E

GEOLOGIC FORMATIONS

The exposed rock in the area under study for the extensions of the Highland Scenic Highway is sedimentary in origin and range from Late Devonian to Early Pennsylvanian in age.

Descriptions of these geologic formations are presented below. More detailed information on the area's geology can be found in the "Soils and Geology Technical Report".[6]

Pottsville Group

The Pottsville Group of Early Pennsylvanian age consists predominantly of sandstones and conglomerates with some coal and shale beds. It is subdivided into the Kanawha and New River Formations.

Mauch Chunk Group

The Mauch Chunk Group is formed primarily of nonmarine shales and sandstones with red beds predominating near the top. It is subdivided into the Bluestone, Princeton, Hinton, and Bluefield Formations.

Greenbrier Group

The Greenbrier Group of Middle Mississippian age is composed of limestone with several shale or sandy shale interbeds. The limestones tend to be massive, dark gray, frequently oolitic units.

Maccrady Group

The Maccrady Group is quite thin. The upper portion is a gray, weathering to yellow, argillacecous limestone. The remainder is a calcareous shale.

Pocono Group

The Pocono Group is the basal member of the Mississippian strata. It is a coarse reddish-brown sandstone, often cross bedded and conglomeratic. Brown, bluish-gray, and occasionally red sandy shales and impure, lenticular coals occur as interbeds. The Broad Ford and the Berea Sandstones are potential oil and gas bearing members of this group.

Hampshire Formation

The Hampshire Formation, also known as the Catskill Series, is the youngest Devonian formation in the study area. It is composed of red to green, cross bedded shaly sandstones and sandy shales with streaks of coal.

Chemung Group

The Chemung Group is formed by a series of interbedded, olive-colored sandstones and shales. The sandstones are fine grained, hard, and can be massive or flaggy. The shales are thin bedded and easily eroded.

Stratigraphic units older than the Chemung are not described here because they are not exposed in the study area.

LIST OF PREPARERS

SECTION XI

XI. LIST OF PREPARERS

The following is a listing of personnel who were primarily responsible for preparing this Draft Environmental Impact Statement, their educational and experience backgrounds and the sections of the Statement for which they are responsible:

CONSULTANT PERSONNEL

Robert M. Williams, BSCE, P.E. - General Report Preparation Supervision, Engineering, Air Quality - Chief, Environmental Studies Section, Transportation Division, GFC&C. Twenty-five years experience in highway and transportation planning and design including 8 years experience in preparation of environmental assessments and statements for transportation projects and programs. Has performed environmental studies for highways, bridges, and mass transit facilities in Delaware, Pennsylvania, New York, New Jersey, Massachusetts, Connecticut, Michigan, Indiana, Illinois, Florida, West Virginia, and the Republic of Colombia.

Bettyann C. Bowers, BS, Biology, Certified Wildlife Biologist (TWS), Environmental Professional (NAEP) - General Report Preparation, Wildlife, Water Quality, Wetlands - Environmental Scientist, Transportation Division, GFC&C. Seven years experience in environmental studies and the preparation of environmental assessments and statements for transportation projects. Has performed environmental studies, including aquatic and terrestrial ecology studies, stream surveys and wetland investigations for highways, bridges, and mass transit facilities in Pennsylvania, Massachusetts, Connecticut, New Jersey, New York, Michigan, Florida, Illinois, West Virginia, and the Republic of Colombia.

David F. Royer, BS, Community Development, MRP - Regional Planning, Member, APA - Land Use, Social/Cultural, Consistency with National, Regional and Local Planning, Acquisitions Programs, Economic Impacts - Transportation Planner, Transportation Division, GFC&C. Seven years experience in urban development and transportation planning, traffic engineering and environmental impact studies. Performed environmental and historical impact studies for transportation projects in Pennsylvania, New York, Flordia, and West Virginia.

Joseph B. Kriz, BS, Biology, BA, Geoenvironmental Studies - Water Resources/Quality, Terrestrial and Aquatic Ecology - Environmental Scientist, Transportation Division, GFC&C. Two years experience in environmental studies and the preparation of environmental assessments and statements for highway, bridges, mass transit facilities and community development projects in Pennsylvania, New York, Indiana, Illinois, Florida, and West Virginia.

Patricia S. McPhelim, BA, Political Science, Graduate Work, Economics - Economics, Employment, and Revenue - Economic Analyst, Checchi & Co. Sixteen years experience in economic and market analysis and economic development planning. Participated in economic planning studies in Southeast Asia, South America and the United States, including identification and feasibility analysis of employment generating business opportunities, commodity distribution programs and domestic and international markets of agricultural and crafted products.

Jeanne V. Beekhuis, BA, Psychology, Graduate Work, Business Administration/ Economics - Tourism, Recreational Resources - Tourism Consultant, Checchi & Co. Twenty-nine years experience in economic and marketing analysis, particularly related to tourism development and promotion, real estate development, and industrial, commercial, and residential development. Has performed tourism policy and development studies in Delaware, New York, Virginia, Oklahoma, Pennsylvania, Wisconsin, Arkansas, Massachusetts, West Virginia, Dominican Republic, El Salvador, Costa Rica, Honduras, Argentina, the Bahamas, Puerto Rico, the Virgin Islands, Canada, Iceland, and the Middle East.

Frank A. Smolko, Assoc. Engineering - Engineering, Location Studies - Highway Engineer, Transportation Division, GFC&C. Twenty-five years experience in design and planning of transportation and flood control projects, including highways, expressways, interchanges, mass transit railways, guideways and stations, stream channel protection and relocations, bridges and drainage structures, sanitary landfills, soil conservation and erosion control plans and the preparation of property acquisition and demolition plans. Has performed location planning, preliminary and final engineering studies for projects in Connecticut, Illinois, Pennsylvania, Delaware, New York, New Jersey, District of Columbia, Georgia, West Virginia, Florida, Maryland, Nigeria, and El Salvador. Certified Senior Engineering Technician.

Victor J. DePallo, MLA, Landscape Architecture - Recreation Development Program, Visual Resources Management, Suitability as Scenic Highway - Landscape Architect, Synterra, Ltd. Seven-years experience in landscaping and visual quality management, control, and enhancement for major transportation, urban development, recreational area and parklands development projects. Participated in the preparation of master plans and environmental studies for highways, expressways, mass transit facilities, and residential areas. Has performed assignments in Pennsylvania, New Jersey, New York, West Virginia, Georgia, North Carolina and California.

John G. Diviney, BSCE, MSCE, P.E. - Soils - Soils Engineer, Geotechnical Group, GFC&C. Twelve-years experience in geotechnical investigations, studies and analysis, including ten years with the Pennsylvania Department of Transportation as District Geotechnical Engineer. Has had responsibilities for all geotechnical aspects of more than 150 highway and structures projects in Pennsylvania, New Jersey, and West Virginia including investigations and development of remedial measures for slope, embankment and dam failures.

Bernard Markunas, BS, Geology - Geology, Groundwater - Geologist, Geotechnical Group, GFC&C. Three-years experience in geological and environmental studies, geological engineering and foundation investigations. Supervised foundation investigations for pumping stations, water and sewage treatment plants and dams; supervised a coal exploration program and participated in environmental impact assessments, feasibility studies and groundwater contamination monitoring programs. Has performed assignments in Pennsylvania, New Jersey, West Virginia, and Tennessee.

Russell S. Klingensmith, BSCE, MS, Sanitary Engineering, P.E. - Coal and Mineral Resources - Manager, Mine Drainage Control Group, GFC&C. Thirty-two years experience in coal, mining, and environmental policy, regulatory and control projects and programs, including 17 years supervisory experience with the Commonwealth of Pennsylvania's mining regulatory agencies. Has participated in the preparation of mine drainage control plans, development of regulatory programs, policy establishment, reclamation planning, watershed investigation reports, abandoned mine programs and groundwater quality studies. Has performed assignments in Pennsylvania, Maryland, and West Virginia.

James S. Paxton, BS, Forestry, Timber Resources - Forester, Forest Land Services, Inc. Twenty-two years experience in professional forestry inventory design, supervision, installation, computation and timber appraisals. Has served as a forestry consultant for over twenty-years and been actively engaged in several positions in professional forestry organizations and forestry-related associations. Has served in advisory capacities to Federal and State agencies on forest research management and logging research programs.

Sandra J. Raredon, BA, MA, Archeology - Archeological Resources - James Madison University. Three-years experience as graduate assistant in the Department of Anthropology, James Madison University. Assisted in the planning and execution of archeological surveys and research programs. Served as field survey team leader and principal author of the survey report. Currently with the Department of Anthropology, University of Tennessee.

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